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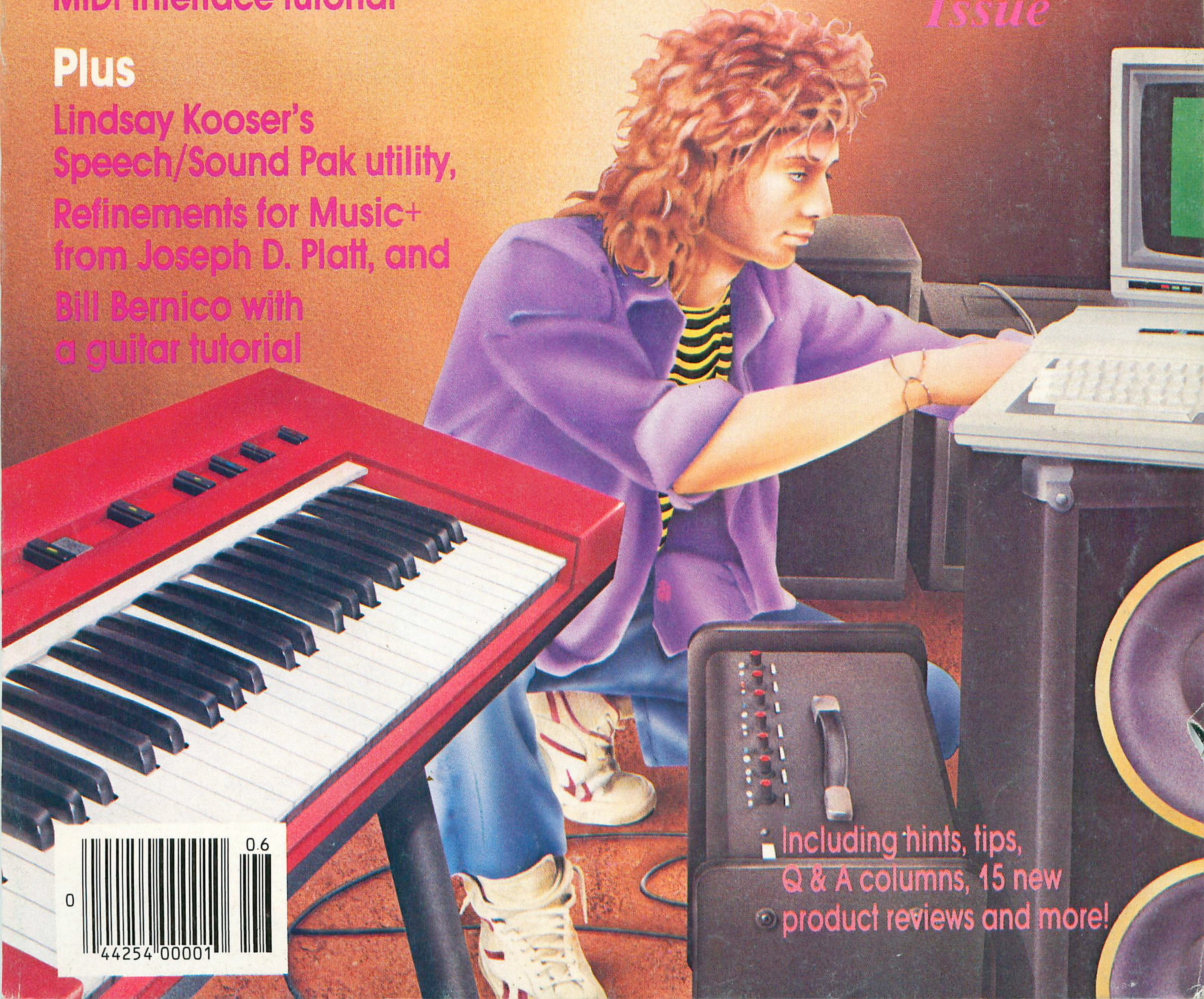

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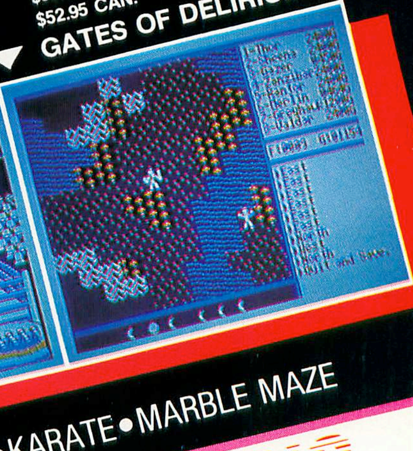

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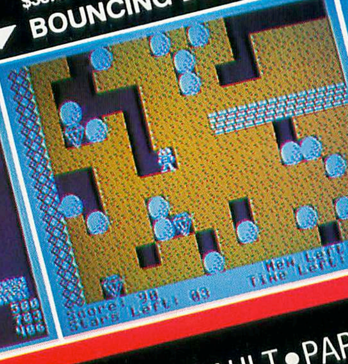

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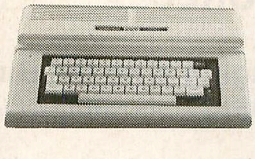

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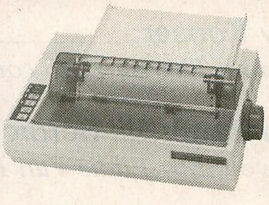

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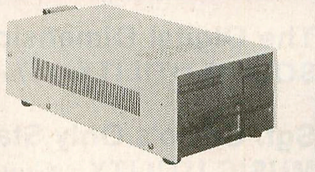

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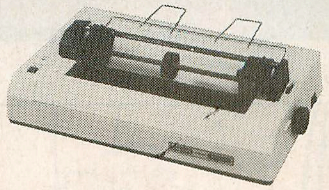

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June 1987 Vol. VI No. 11

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# LETTERS TO THE RAINBOW

## More Excitement Than Ever

*Editor:*

I have been receiving RAINBOW since it was a two-page letter put out by an LPVII. I cherish our magazine and praise you for its content.

How about some information on interfacing hard disk drives with our CoCo? How about Owl Ware's *Winchester BASIC*? What is it really like? You folks *must* be using hard drives. How about some information on which ones and how they work?

Also, I am halfway through the January issue, and have seen two references to *Multi-Vue*. Who puts it out, and how about a review of it?

Now, I'm more excited about CoCo than ever. Please keep us up on the newest and most significant enhancements.

*Gary Britting*
*San Francisco, CA*

*Gary,* Multi-Vue *is a windowing development system which requires OS-9 Level II. It is produced by Radio Shack, but has not yet been released to the public.*

### Super Cosmos Update

*Editor:*

To all owners of a Super Cosmos Connection formerly sold by Cosmos Computer Services, Inc.:

The sales and manufacturing rights to the Super Cosmos Connection have been acquired by Premier Data Systems, Inc. Any warranty questions or problems with a unit sold by Cosmos should be referred to us at 2734 Hillsdale Ct., Green Bay, WI 54303, (414) 434-1222.

*Thomas G. Fezatte*
*Premier Data Systems*

### Fixing the Erratic @

*Editor:*

In March's "Reviewing Reviews," there was a letter from us regarding erratic '@' symbols and other unwanted characters that sometimes appear with *Ultra Telepatch* and some other programs.

I'm pleased to announce that we've found the fix. *Ultra Telepatch* customers are invited to write to us regarding update information.

The exact cause? We're not sure, but the problem seems to appear only on early Korean CoCo 2s, and all the computers we examined have very hot power supplies. We suspect a bug in the SALT chip is causing an erratic power drop to the keyboard. The solution is simple — a longer delay time in the keyboard debounce routine.

Unfortunately this will not help Mr. Long and his problems with *Penpal*. Perhaps a *Penpal* user will be able to incorporate a similar fix into *Penpal*'s keyboard driver and forward it to him.

*Bob van der Poel*
*Edmonton, Alberta*

### The Well-Traveled CoCo

*Editor:*

I brought with me to Ireland a 64K CoCo, disk drive and a CGP-115 printer. I also brought a 240v-to-115v transformer. Upon hooking it all up, everything worked fine. The disk drive spun at the right speed, the TV looked just fine and CoCo delivered the goods. My worst fears were unfounded — for about three months. Then, the picture started to become unstable and upon "open-heart surgery" I discovered some internal voltages weren't what they should have been. I have since bought a new CoCo from England that feeds an English, PAL-standard TV.

I think that Radio Shack's warning about the transformers for 60 Hz U.S. mains voltage not being compatible with 50 Hz are probably true and that American CoCos don't travel well abroad.

*John Perry*
*Glenageary, Ireland*

---

### BACK TALK

*Editor:*

The January 1987 "Downloads" column contains a letter from Allen Drennan. The reason the caller's BREAK key (CTRL-C) isn't disabled is because of an error in the machine language listing of Mr. Downard's program. I believe his original listing of the program trapped the caller's CLEAR key (ASCII 12) and not the caller's BREAK key (ASCII 3). I made that change a long time ago to his fine program, and it works beautifully with my modified version of *Rainboard*. Speaking of modifications to *Rainboard*, has the author ever considered adding the Xmodem protocol to it?

Also, Mr. Downard's review of *D.L. LOGO* is right on the money as far as being a superb implementation of LOGO. However, the demo program on my disk runs just beautifully. I suspect that superfluous drivers on the boot disk may be causing the OM Error.

*Thomas P. Reitzel*
*Newalla, OK*

### Best of Both Worlds

*Editor:*

In response to Tony Rapson's letter appearing in January [Page 6], certain features of ADOS using the Disto Super Controller with the CoCo 3 *do* work. When you first power up, you get the message: Disk Extended Color BASIC 2.1. Then, if you do the poke to change DOSs, ADOS will come up as: Disk Extended Color BASIC 2.0.

Not all of the commands work as before. `SCAN` and `CAT` do not work, but you still get to use your double-sided drives at 6 ms stepping (not supported by RS-DOS).

The next problem is what new features of the CoCo 3 will work with ADOS. That all depends upon how you do it. Programs typed in and immediately run under ADOS with new CoCo 3 commands will not work and give SN Errors. If you type a program in and debug it under RS-DOS, then switch to ADOS and load your program with the new commands in it. It will work fine. When you list your program under ADOS, the commands will not appear in the listing as they were typed in because they are not in the ADOS vocabulary; rather, they will appear as commands such as `RAM` and `AUTO`, which look wrong, but work just as the commands that you entered in RS-DOS.

By doing this you can have the best of both worlds: You can use both sides of your double-sided disks at 6 ms from ADOS and use the new Hi-Res text or graphics screens on the CoCo 3!

*Eric Santanen*
*Stanhope, NJ*

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## COCO 3

*Editor:*

I have been using Roger Schrag's disk backup utility since its appearance in the December 1983 issue of RAINBOW. This excellent utility can be modified to do single-pass backups on a 512K CoCo 3 by loading the utility and then running the following program. Backup time on a two-drive system is not improved (it's already fast), but it really shines if for some reason you get stuck with only a single operating drive. This is because only one disk swap is required.

```
 5 DIMA(39),B(39)
10 DATA127,255,161,18,18,18,32,
   24,26,118,189,23,78,18,193,
   111,127,255,161,18,18,18,24,
   189,23,78,18,26,118,91,235,
   108,159,17,94,124,255,161,57
20 DATA4579,4580,4581,4582,4583,
   4584,4585,4618,4668,4669,4680,
   4681,4682,4683,4685,4801,4805,
   4806,4807,4808,4809,4810,4824,
   4976,4977,4978,4979,4988,4989,
   4993,4996,5966,5967,5968,5969,
   5970,5971,5972,5973
30 FORX=0TO38:READA:A(X)=
   A:NEXTX
40 FORX=0TO38:READB(X)=
   B:NEXTX
50 FORX=0TO38:POKEB(X),A(X):
   NEXTX
```

*Ron Goodger*
*Paw Paw, MI*

## REQUEST HOTLINE

*Editor:*

I'm looking for educational software focusing on calculus, mechanics and thermodynamics for mechanical engineering studies at a university. How do I locate information on how to purchase this type of software?

*Bill Snyder*
*565 Leighton Avenue*
*Youngstown, OH 44512*

### Banners, Banners Everywhere

*Editor:*

I am looking for a printer program pack that makes invitations, banners, and signs.

*Mrs. Willie Robinson*
*1010 N.W. 58th Street*
*Miami, FL 33127*

### INFORMATION PLEASE

*Editor:*

I own a Digital Equipment LA50 printer. I think I have tried everything possible to make it work with my CoCo. I cannot get a line feed with a carriage return. If anyone has a similar printer and has overcome this problem, please write me at 2410 Imperial Oaks, 52761.

*Joe Barnard*
*Muscatine, IA*

### CoCo 3 Quandary

*Editor:*

I have purchased a CoCo 3. It works fine with two exceptions. It is not compatible with my Zenith 13-inch color TV. The green screen continuously bounces making it difficult to view. Also, my *Dynacalc* software Version 5.1:1 will not load. Can someone tell me how to get *Dynacalc* to load beyond the `LOADING HELPS.BIN`? It stops there and the red light on the disk drive continues, but the program does not load.

*Walter J. Campbell*
*605 N. Commercial, Box 1*
*Mankato, KS 66956*

### The ML Roadblock

*Editor:*

I have a problem with my machine — some machine language programs do not run all the way. For example, with *VIP Database*, it runs fine up to the point of using the database. When I try to use that portion of the program, the cursor locks up on the top line. I cannot get the cursor off the line at the extreme left edge, covering the first letter, which is replaced by a left parenthesis. The disk is OK; my friend's database acts the same way. There are other programs such as *Sands of Egypt* that run for a time, then lock up.

*Jack Wannenwetsch*
*3733 Hulberton Road*
*Holley, NY 14470*

### Calling All Trekkies

*Editor:*

I would like to hear from anyone who has been able to run Jake Commander's *Space Trek* program in the May 1983 issue of the Color Computer Magazine. A program printout would be greatly appreciated.

*Randall Winter*
*10160 S.R. 53N*
*Upper Sandusky, OH 43351*

### Just Outclassed

*Editor:*

I have a 64K CoCo 2, two drives and an Epson JX-80 color printer. I run both JDOS and RS-DOS. It doesn't make much sense to me to have the best color graphics computer and a fantastic color printer and not be able to find graphics software (e.g., *CoCo Max*, *Graphicom*, etc.) compatible with them. I have a *CoCo Max II* that is about 90 percent usable (the double strike doesn't work, and the line spacing is about ⅛-inch too wide) when configured for the FX-80. When configured for the Gemini 10, it only prints in double strike and the line spacing is about ⅛-inch too close. Are there plans for *CoCo Max* to be available for the JX-80? Is there any graphics software compatible with my system out there? It seems my printer is only compatible with the more expensive IBM systems. Did I outclass my computer when I bought my printer?

*Jo Ernst*
*P.O. Box 4044*
*APO, NY 09009*

### The Beat Goes On

*Editor:*

I play in a rock group and our light show (36 "cans" at approximately 15 kilowatts) is completely controlled by Radio Shack Plug 'n Power Modules. I have read all of Alexander B. Trevor's articles in past issues concerning the X10 protocol and application. I have been able to tailor the program to the group's needs, e.g., scene generation, random sequencing, etc. My problem is that I can't utilize my program. The new Appliance Controller I have (R.S. Catalog No. 26-3142) doesn't seem to support it, and using the included ROM-Pak (both manually and pre-programmed) is too sluggish to track the dynamics of the music. The original P 'n P Controller that Mr. Trevor used is his article seems to be the more straight-through device I need.

If anyone has one of these original controllers, please contact me at (616) 258-8777 anytime.

*John M. Fredericks*
*P.O. Box 1016*
*Kalkaska, MI 49646*

### Terminally Smart

*Editor:*

I have a Kantronics UTU-XT interface, which is a smart modem for my ham radio. It is designed to use an RS-232 port and just about any terminal program.

However, all of the CoCo terminal programs that work well with telephone modems lack the features that would make the programs more useful with a ham radio smart modem.

Kantronics has a program called *UTU-Term/Pacterm* for IBM Compatibles, but they inform me there are no plans to make the program for the CoCo.

I would like to find a program like the Clay Abrams *NEWRTTYCW*, which would operate the Kantronics UTU-XT. The only addition I could think of would be using an RS-232 pack for the UTU-XT and connecting a printer to the 4-pin CoCo RS-232 port for truly deluxe ham operation.

*David J. Johnstone*
*19 Margerie Street*
*Torrington, CT 06790*

### Death in the 80-Column Mode

*Editor:*

I am using a CoCo 2 with the Disto Super Controller and 80-column board. I bought this with the idea of using 80 columns on a high resolution amber monitor, but I find that all my terminal/modem programs die when I am in 80-column mode.

Will I have to go to OS-9 before it becomes possible? Also, I would like to trade graphics pictures with other enthusiasts. I can use DSDD disks.

*Brian Carling*
*220 Cedarview Drive*
*Antioch, TN 37013*

### A Baudy Question

*Editor:*

I am having trouble with my *CoCo Max II*. I have a DMP-130 printer, and I don't know which baud rate to use. If you could give me any help it would be great!

*Chris Casson*
*3 Channing Lane*
*Camillus, NY 13031*

### Vive le Francais

*Editor:*

I am a French speaking person. I own a CoCo 2 and I have been using it for the last three years. I also own two disk drives and a DMP-105 printer. In 1985, Radio Shack was announcing a French version of *Scripsit*; I am still waiting for it. I would like to know if there is any word processor able to generate the French characters that we can pass directly to the printer.

I would like to know if any word processor available for the CoCo 3 can generate those characters, since those special or foreign characters are located in codes 128 to 159 in high definition.

*Gilbert Bourget*
*28 Ave. de l'Eglise*
*Perce, Quebec*
*Canada G0C 2L0*

---

## BOUQUETS

*Editor:*

I would like to tell you about Bob van der Poel Software and Plan Net Forms. First I ordered *Ultra Label* and couldn't get it configured but, thanks to Bob, I now have it working perfectly. It is one terrific program and does everything I want it to. The second company, Plan Net Forms, sent me the plans for an RS-232 switching box. For $5 and $20 worth of parts, I have an RS-232 switch that works great. It was very easy to make and I would recommend it to anyone.

*G.D. Croucher*
*Scarbrough, Ontario*

### A Pat to the Other Guy

*Editor:*

I want to praise the Other Guy's Software for the extremely fast service they provided to me in the ordering of their *CoCo Windows*. I ordered the program on a Saturday and received the disk Thursday morning — without a doubt one of the fastest mail order turn around times I have ever dealt with. Thank you, Other Guy's.

*Clell Harmon*
*Wichita, KS*

---

## PEN PALS

- I have a 64K CoCo 2, disk drive, cassette, modem and a DMP-105 printer. I am interested in all types of programs.

*Becky Cravens*
*1218 North C Street*
*Rogers, AR 72756*

- I am looking for a female pen pal. I am 14 years old and have a CoCo 2 with a disk drive. I enjoy Adventures and games with Hi-Res graphics.

*Brian Murry*
*142 Rock Street*
*Tucson, AZ 85747*

- I'm 13 years old and I'm looking for pen pals of any age. I have a CoCo and a CoCo 3 with *EARS*, *SuperVoice* and *CoCo Max*. I have just started using OS-9 and I love to play games.

*Andy Blount*
*339 32½ Road*
*Palisade, CA 81526*

- If there are any Korean-based readers out there, drop me a line through MPS.

*Gary Britting*
*HHC 19th Spt. Box 2327*
*APO, San Francisco, CA 96212*

- I am looking for pen pals from another country. I speak English and am 15 years old. I have a CoCo 2 with cassette, disk drive, modem and a DMP-130.

*Mike Jakubiak*
*125 Elmwood Drive*
*Meriden, CT 06450*

- I am 12 years old and am looking for a pen pal the same age or older. I have a CoCo 3 and I enjoy graphics games, Adventures and music programs.

*Robert Slabinski*
*195 A State Street Apt. 159*
*Meriden, CT 06450*

- I am seeking pen pals with ham radio interests for an exchange of ideas and concepts. I want to find real ham radio terminal programs with split-screen and type ahead buffers, etc., to operate Kantronics UTU-XT/P and other TNCs.

*David Johnstone*
*19 Margerie Street*
*Torrington, CT 06790*

- I'm looking for pen pals who love the CoCo as much as I do. I have a 64K CoCo with disk drives and cassette.

*John Colburn*
*604 Maple Street*
*Rossville, GA 30741*

- If you love your CoCo, games of all types and THE RAINBOW, please write to me.

*Raymond Lueders*
*1341 Sea Biscuit Lane*
*Hanover Park, IL 60103*

- I am 16 years old and I am looking for someone who is interested in games, Simu-

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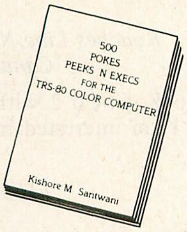
## FOR THE TRS-80 COCO



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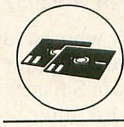

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lations and Adventures. I have a 64K CoCo 2, disk drives and a modem.

*Fred Fabi*
*1513 N. Franklin Street*
*Litchfield, IL 62056*

- I have started the Trading Post pen pal club. Yearly fee is $5. It includes a monthly newsletter and a library with many, many programs for trading. Just be willing to write with hints and tips, and maybe send some of your programs to trade.

*John Licata*
*5114 Roberta Lane*
*Richton Park, IL*

- I am looking for pen pals all around the world. I enjoy programming with my 64K CoCo 2, printer, disk drive and cassette.

*Charles Baum*
*1116 West 39th Place*
*Hobart, IN 46342*

- I would like to correspond with RAINBOW readers in the south Louisiana area. I have a CoCo 2, disk drive, cassette and modem.

*Tommy LaFleur*
*5021 Airline Hwy. #24*
*Metairie, LA 70004*

- I am almost 13 years old and in the seventh grade. I have a 64K CoCo, disk drive, cassette and a DMP-105. I love arcade games and Adventures.

*Robbie Fink*
*128 Woolens Road*
*Elkton, MD 21921*

- I am looking for a pen pal with an active imagination to co-author Adventure programs. For more information, please send an SASE.

*Carl Foote*
*16 Johnson Street*
*Sanford, ME 04073*

- I would like to write to people of any age and from any country. My system includes CoCo 2 and 3, SSDD drive, modem, Gemini 10X printer and phone accountant. I want to buy a used SSDD drive or DSDD system.

*Mike Lowe*
*2093 Candlewood*
*Charlotte, MI 48813*

- Anyone interested in joining the CoCo Nuts pen pal club, please write. Different programs will be exchanged each month, and a newsletter will be available beginning in April.

*Paul White*
*Rt. 5, Box 379*
*Fulton, MO 65251*

- I am 13 years old and would like to have pen pals. I have a 64K CoCo, disk drive, cassette, modem, a CGP-115 and a DMP-105 printer, and the Speech/Sound Cartridge.

*Chuck Rice*
*21 Mountain Terrace*
*Asheville, NC 28806*

- I am looking for a pen pal. I would prefer a Canadian or British pen pal, but all are welcome. I am a big Dr. Who fan and I have an interest in *Star Trek*.

*Sherman Young III*
*185 Mount Carmel Road*
*Asheville, NC 28806*

- There is a new pen pal listing newsletter for CoCo users called *CoCo Scribe Magazine*. I have recently moved, so if you sent a letter to my old address and it was returned, please try again.

*Erick Molnar*
*1658 Idelwild Drive*
*Reno, NV 89509*

- I am looking for pen pals in the NYC area for P-51 partner. I would like pen pals from all over. I have a CoCo 2, modem and disk.

*Richard Craig*
*89-25 Parsons Blvd.*
*Jamacia, NY 11432*

- I am 17 years old and I have a CoCo 2, disk drive, cassette, modem and a DMP-105. I am an avid gamer and have a huge library of software. I'm also interested in BASIC and assembly programming, and astronomy.

*Dan Bowden*
*4866 Wildwood Drive*
*North Bend, OR 97459*

- I am 14 years old and want a pen pal. I have a CoCo 2, multipack, disk drive, cassette, DMP-105, modem and lots of games.

*Dino Di Enno*
*715 South Hutchinson Street*
*Philadelphia, PA 19147*

- As author of *CoCo Bright* [February 1987, Page 49], I would like to correspond with other machine language programmers. You can write to me at P.O. Box 100087, 37210.

*David C. Billen*
*Nashville, TN*

- Before I discovered THE RAINBOW, I felt like I was the only CoCo owner in the world. Now I feel like the only one in Houston! If there's anyone out there, please write!

*Francisco Rios*
*4102 Lufborough Drive*
*Houston, TX 77066*

- I am 15 years old. My system is a 64K CoCo 1 with two disk drives, a DMP-105 and a modem. I am interested in learning OS-9 and machine language.

*Corrie Bender*
*11216 SE 235th Place*
*Kent, WA 98031*

- I would enjoy having pen pals who have experience with the CoCo and like computer languages. I would like to hear from Seventh Day Adventists and others who have a CoCo. I am 25 years old.

*Ernie Bennett*
*Route 2, Box 158-A*
*Beckley, WV 25801*

- I would like to have Polish-speaking pen pals from all over the world who share an interest in the CoCo and in swapping information. I have a 64K CoCo 2 with cassette, stacks of RAINBOW and lots of programs.

*Tomasz Szafraniec*
*3/14 Ridley Street*
*Albion VIC, Australia 3020*

- I would like a pen pal in Belgium, the Netherlands, Great Britain, Germany or other European countries.

*Rudi Bosschaerts*
*Weerstandsplein 7*
*B2510 Mortsel, Belgium*

- I'm Brazilian and I have a 64K ECB CoCo with one disk drive, a modem and a printer. I would like to correspond with other CoCo owners around the world.

*Frank Costa Barbosa Hudson*
*Rua Constantino Paleta, 26/601*
*CEP 36100 - Juiz de Fora - MG*
*Brazil*

- I would like to correspond with other CoCo nuts out there.

*Rick Normandeau*
*P.O. Box 6932*
*Wetaskiwin, Alberta*
*Canada T9A 2G5*

- I am 12 years old and a CoCo user. I'm looking for pen pals between the ages of 18 to 30.

*Dean Sheppard*
*P.O. Box 117*
*Lewisporte, Newfoundland*
*Canada A0G 3A0*

- I am a game collector and would like to have more. If you would like to trade games, please write.

*D.A. Heisz*
*Roaches Line, Newfoundland*
*Canada A0A 1W0*

- I have a 64K CoCo 2 with cassette recorder, and I am interested in finding pen pals.

*Deny Wilson*
*131 Leeville Drive*
*Box 1393*
*Assiniboia, Saskatchewan*
*Canada S0H 0B0*

- I'm looking for a Canadian pen pal. I am 13 years old and have a CoCo 3, DMP-105 printer and a disk drive.

*Ian Boisvert*
*P.O. Box 259*
*Burstall, Saskatchewan*
*Canada S0N 0H0*

- I am 14 years old and have a CoCo 2, cassette and a Speech/Sound Pak. I am looking for a Canadian pen pal.

*Randy Pekar*
*Box 7, Site 1*
*Yorkton, Saskatchewan*

- I want to get in touch with any Dragon or Tandy users wanting to swap information, games, etc.

*S.J. Goodwin*
*15 St. Stephen Road*
*Penketh, Nr. Warrington*
*Cheshire, England WA5 2AN*

- I am looking for pen pals all over the world.

*Werner Daniel Streidt*
*8 Hassan Sabry Street c/o GTZ*
*Zamalek, Cairo*
*Egypt*

**THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.**

**Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type `RAI` to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type `LET` to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.**

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# A CoCo 3 Catalyst

I am just home from the largest and most successful RAINBOWfest ever — the one in Chicago, April 10-12. And, while we were certainly pleased by the crowds, the success of virtually all the booths, the seminars and the reception of our live CoCo Cat mascot, the biggest thing at the show, for me and many others, I believe, was the happy, smiling, excited faces of those who attended!

In his report on Delphi, Marty Goodman (who graciously pinch-hit as breakfast speaker for Greg Zumwalt who was called away from the show at the last minute) ended several pages of copy with this phrase: "The CoCo Lives!"

Credit much of this to CoCo 3 — which, for the first time, saw third-party software at a RAINBOWfest — but, also, to a new infusion of interest and enthusiasm for CoCo 1 and 2, as well. RAINBOWfest proved, I think, to all there, that the CoCo 3 is, indeed, a catalyst not only for itself, but the entire CoCo Community. In fact, Color Computer 2s sold out at the show.

How come this happened? My analysis is pretty simple. We had a good show last fall in New Jersey, but it came only a couple of weeks after the CoCo 3 was available. Consequently, there were CoCo 3s available there and a lot of interest — but no product. RAINBOWfest-Chicago was the first time products were available in any quantity. And, judging from the success of the products that were there, you'll see even more in Princeton — at our fall 'fest.

Interestingly, here is a parallel. This time, OS-9 Level II has been out only a short time. By the time you get to Princeton, developers and programmers will have had several months to work with it. I think those of you who attend the October RAINBOWfest will see some startling things.

But the really good thing about the RAINBOWfest was the enthusiasm and interest in the CoCo in general — be it the 1s, 2s or 3s. Yes, Marty, CoCo *does* live! And it will be living for a long time to come.

I expect the Princeton RAINBOWfest will be larger even than this Chicago show. I look forward to seeing you there.

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* * *

Two interesting things will happen next month that are deserving of your attention.

First, we will be taking advance orders for *The Complete Rainbow Guide to OS-9 Level II.* Dale Puckett and Peter Dibble are hard at work writing this all-encompassing *Guide*, which will lead you step-by-step in the use and operation of OS-9 Level II. The *Guide* will be less technical than *The Complete Rainbow Guide to OS-9* that we published a couple of years ago. It is a must buy.

We will sell the *Guide* on an advance purchase basis only. We expect it to be shipped in mid-August, and details on how to order will be in next month's (Sixth Anniversary Issue) magazine. I know you'll have to hurry to order it, but we want to get it to the printer as quickly as possible.

In addition, next month's issue will carry a nomination ballot for a Color Computer Hall of Fame, which we plan to inaugurate either at RAINBOWfest-Princeton or next year's Chicago show. This will be done, most likely, at a dress-up dinner and, I think, it is something long overdue.

We want you to be a part of the Hall of Fame, so we will be asking for nominations and, later, for ballots based on the nominations. Preliminary nominations were made by those who attended the Chicago show.

There are a few rules. First, of course, there will be a deadline. And, second, we will require a name, address and telephone number on each nomination. That is because you can only make one nomination. We don't want anyone to "stuff" the ballot box.

This is an exciting prospect and as soon as we have some details about the actual induction banquet, I'll let everyone know. In the meantime, in the true tradition of the CoCo Community, please be thinking of who you would like to nominate so that you can return the form quickly next month.

Lastly, we *do* have a surprise for you next month in our Anniversary Issue. I think you'll like it. Stay tuned!

**— Lonnie Falk**

> ***"Dale Puckett and Peter Dibble are hard at work writing this all-encompassing* Guide, *which will lead you step-by-step in the use and operation of OS-9 Level II."***

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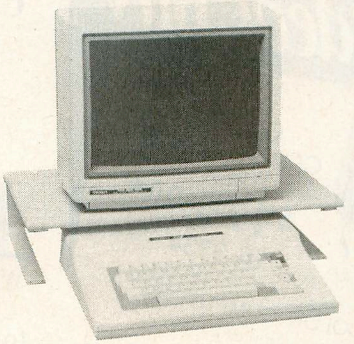

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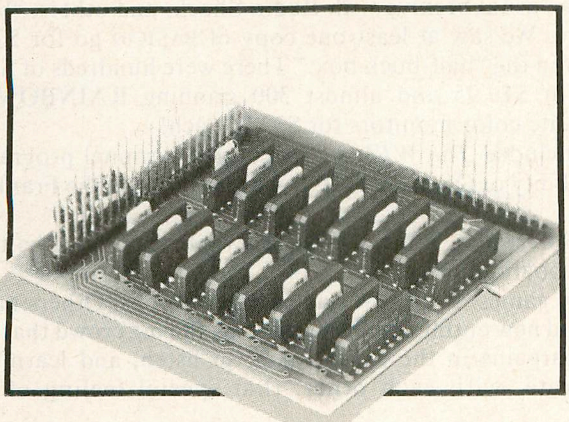

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# BUILDING JUNE'S RAINBOW

## CoCo Community Breakfast with Marty . . .
## a smorgasbord of RAINBOWfest seminars . . .
## . . . and an a la carte feast in our exhibit hall

RAINBOWfest-Chicago, April 10-12, saw the emergence of new faces, new products, new excitement and new optimism about the Color Computer Community. We just got back last night from the fifth annual show in the Windy City and can report a good time was had by all!

The keynote of the show was sounded by **Dr. Martin H. Goodman**. Well-known for his outspokenness, as well as expertise, Marty graciously consented at the eleventh hour to deliver the CoCo Community Breakfast address when scheduled speaker **Greg Zumwalt** was called away from the show. Sharing the dais with the "CoCo establishment," including **Dale Puckett**, **Bill Barden** and Tandy's own **Ed Juge**, maverick Marty maintained his patented "independent perspective" as he provided an upbeat review of the CoCo's past and forecast a similar development cycle for the CoCo 3. He praised Tandy's openness in making technical information available to users and was most optimistic about the future. "OS-9 will really unlock the power of the CoCo 3," predicted Marty, adding, "We should expect a long life for the CoCo 3, just as we are seeing with the earlier CoCo." In summary, Marty echoed the sentiment that prevailed at the show: We've come a long way and we're still gathering speed.

With the physique and the red suspenders of a fireman, **Peter Dibble**, co-author of *The Complete Rainbow Guide to OS-9*, made his RAINBOWfest debut. It was standing room only in his, and several other, seminars. Peter discussed the new OS-9 Level II.

Another well-attended seminar concerned CoCo 3 graphics. **Erik Gavriluk** and **Greg Miller** fielded questions about their new *Color Max 3* graphics editor, which was one of the most exciting new products available at the show — until Computize was sold out!

While **CoCo Cat** did not hold a seminar, THE RAINBOW's furry feline has a sore paw from shaking hands, claims to be "hugged out," and gives life-saver credit to a concealed, battery-operated fan. In addition to serving as official greeter, CoCo Cat led fans to the Educational Sandbox, where youngsters and their parents were given a hands-on introduction to the Color Computer by Tandy-trained experts.

The exhibit hall was the usual beehive with Radio Shack, and others, "blowing out" all sorts of software. We saw at least one copy of BASIC09 go for 50 cents, but couldn't find another in the "half-buck box." There were hundreds of Speech/Sound Paks available for $19.95 and almost 300 grinning RAINBOWfesters carried off CM-3 composite color monitors for $99.95 each!

Brand new products included *The WIZ*, a full-featured terminal program that uses the windowing capability of OS-9 Level II. It was available in the Frank Hogg Laboratory booth.

HJL introduced the Softswitch, a novel printer switcher that can be toggled manually or through keyboard control.

**Tom Mix** had two new games. RAINBOW had two new books. Others had new utilities, new hardware and new enthusiasm generated by the big crowd that turned out to seek, and find, bargains in the exhibit hall, to listen, and learn, at the seminars and to celebrate, with each other, that special feeling of CoCo Community.

If you'd like to join the growing CoCo Community, we promise our subscribers we'll send THE RAINBOW "welcome wagon" by your house each month with all the CoCo news and views, so you'll be ready for our October-fest, in Princeton, New Jersey, this fall!

**— Jim Reed**

'See our other ads on pages 67 & 69'

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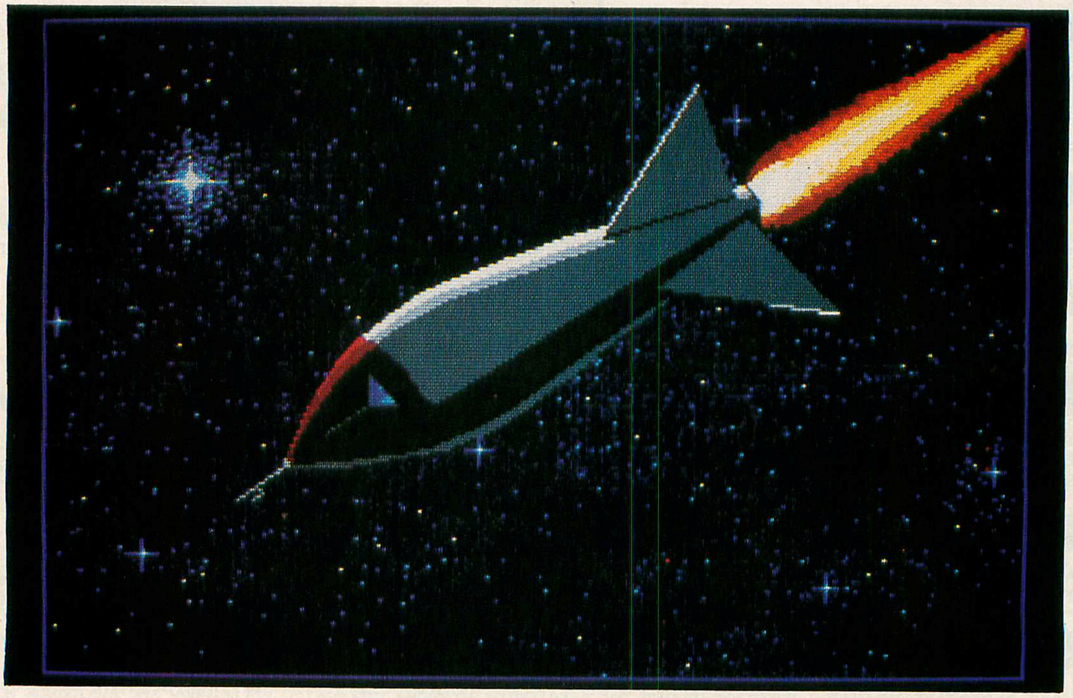
# CoCo Gallery

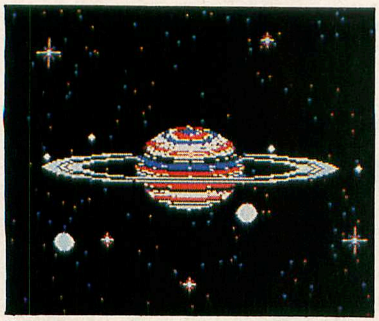


**Ship**

**Tom LoConte**
**Rocky Point, New York**

Tom created this vivid representation of a rocket ship on the CoCo 3 with a program he wrote. Tom has an A.S. degree in computer science and is working on a B.S.

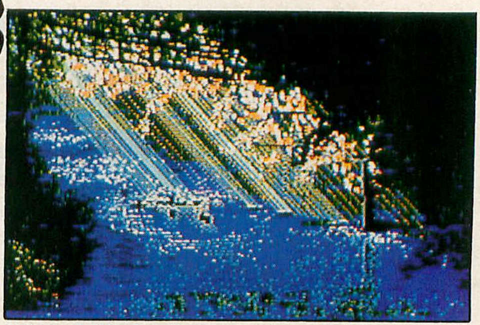
Honorable Mention



**Saturn**

**Andrew Deal**
**Kingston, Tennessee**

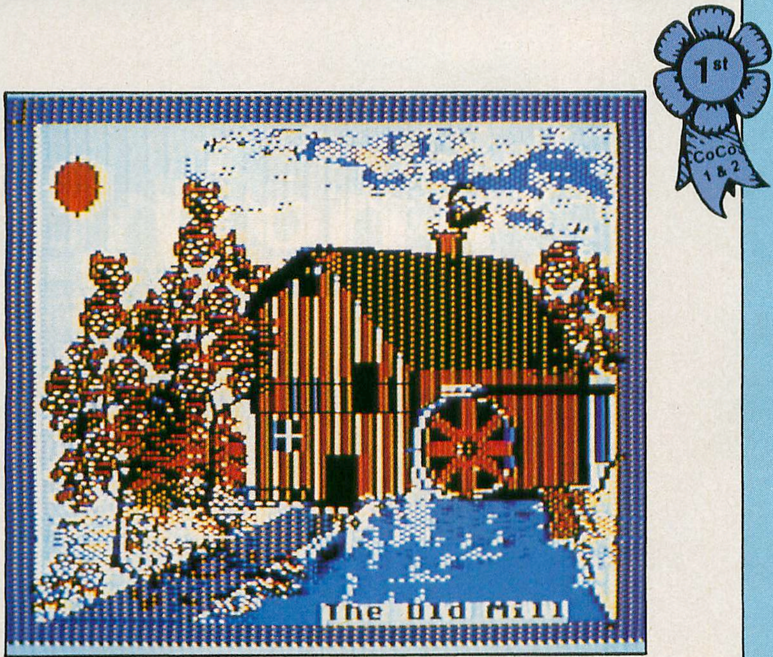
Andrew created this realistic view of the second largest planet with BASIC.



**White Mill Creek**

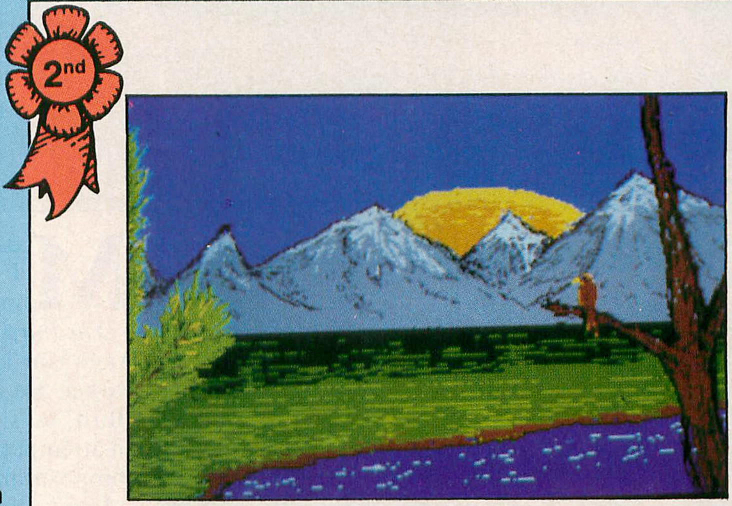
**John Murvine**
**Ebensburg, Pennsylvania**

This relaxing view of a stream with the sun peeking through the trees was created in BASIC on the CoCo 3. This is a real creek by John's home.



**Old Mill** **Floyd Keirnan**
Orange, California

This picture of a mill was created with BASIC and *Graphicom*. Floyd is a retired electronics engineer and has had his CoCo for over five years.



**Mountain** **Steve Boyer**
Mart, Texas

Steve created this mountainous scene with a BASIC program he wrote on the CoCo 3. Steve is currently studying computer science at Texas State Technical Institute.

**SHOWCASE YOUR BEST!** You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.

We will award two first prizes of $25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of $15 and one third prize of $10. Honorable Mentions may also be given

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

**— Angela Kapfhammer, Curator**

# Singing with the Bird

By Val Burke

Music has always been of great interest to me, and I have written *Yardbird* in order to share my interest with the CoCo Community.

*Yardbird* is a music program dedicated to the great American jazz legend and improvisation genius, Charlie Parker. He is known to the music world as "Yardbird," or "Bird" for short, thus the name of this program. I have made an attempt to adapt one of his most challenging and famous compositions, "Donnalee," for the CoCo.

I am sure that CoCo enthusiasts who play an instrument or love to listen to jazz will find this adaptation quite interesting. Those who are not musically inclined will find it a lot of fun just to try and hum along with the melody, or better yet, to learn it.

---

*Val Burke lives in Red Oak, Georgia, and has owned a CoCo for two years. A professional musician, Val is learning to program the computer.*

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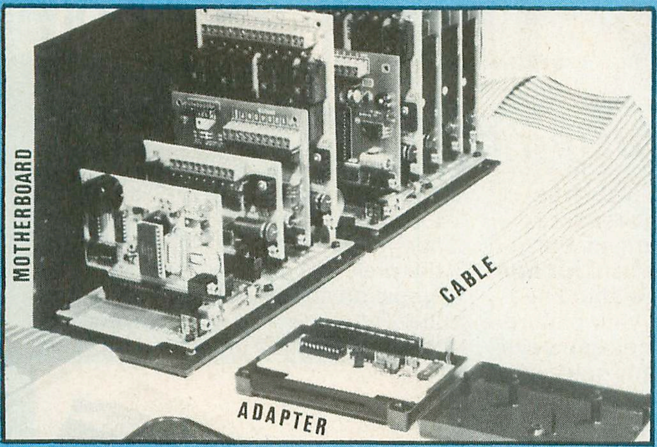
The A-BUS is backed by Alpha's continuing support (our 11th year, 50000 customers in over 60 countries).

The complete set of A-BUS User's Manuals is available for $10.



**An A-BUS system with two Motherboards**
**A-BUS adapter in foreground**

**The A-BUS system works with the original CoCo, the CoCo 2 and the CoCo 3.**

## About the A-BUS system:

- All the A-BUS cards are very easy to use with any language that can read or write to a Port or Memory. In BASIC, use INP and OUT (or PEEK and POKE with Apples and Tandy Color Computers)
- They are all compatible with each other. You can mix and match up to 25 cards to fit your application. Card addresses are easily set with jumpers.
- A-BUS cards are shipped with power supplies (except PD-123) and detailed manuals (including schematics and programming examples).

### Relay Card RE-140: $129

Includes eight industrial relays, (3 amp contacts, SPST) individually controlled and latched. 8 LED's show status. Easy to use (OUT or POKE in BASIC). Card address is jumper selectable.

### Reed Relay Card RE-156: $99

Same features as above, but uses 8 Reed Relays to switch low level signals (20mA max). Use as a channel selector, solid state relay driver, etc.

### Analog Input Card AD-142: $129

Eight analog inputs. 0 to +5V range can be expanded to 100V by adding a resistor. 8 bit resolution (20mV). Conversion time 120us. Perfect to measure voltage, temperature, light levels, pressure, etc. Very easy to use.

### 12 Bit A/D Converter AN-146: $139

This analog to digital converter is accurate to .025%. Input range is −4V to +4V. Resolution: 1 millivolt. The on board amplifier boosts signals up to 50 times to read microvolts. Conversion time is 130ms. Ideal for thermocouple strain gauge, etc. 1 channel. (Expand to 8 channels using the RE-156 card).

### Digital Input Card IN-141: $59

The eight inputs are optically isolated, so it's safe and easy to connect any "on/off" devices, such as switches, thermostats, alarm loops, etc. to your computer. To read the eight inputs, simply use BASIC INP (or PEEK).

### 24 Line TTL I/O DG-148: $65

Connect 24 input or output signals (switches or any TTL device) to your computer. The card can be set for: input, latched output, strobed output, strobed input, and/or bidirectional strobed I/O. Uses the 8255A chip.

### Clock with Alarm CL-144: $89

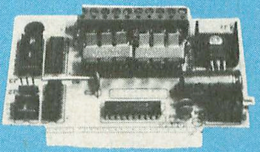
Powerful clock/calendar with: battery backup for Time, Date and Alarm setting (time and date); built in alarm relay, led and buzzer; timing to 1/100 second. Easy to use decimal format. Lithium battery included.

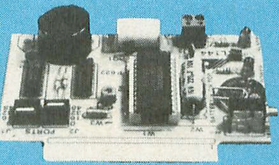
### Touch Tone® Decoder PH-145: $79

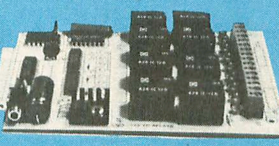
Each tone is converted into a number which is stored on the board. Simply read the number with INP or POKE. Use for remote control projects, etc.

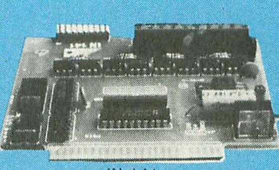
### A-BUS Prototyping Card PR-152: $15

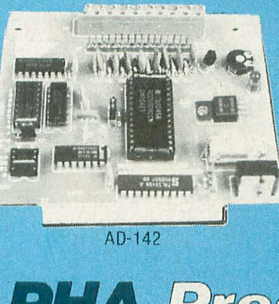
3½ by 4½ in. with power and ground bus. Fits up to 10 I.C.s


ST-143


CL-144


RE-140


IN-141


AD-142

### Smart Stepper Controller SC-149: $299

World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control: coordinate (relative or absolute), ramping, speed, step type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 8 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). Send for SC-149 flyer.

**Remote Control Keypad Option RC-121: $49**
To control the 4 motors directly, and "teach" sequences of motions.

**Power Driver Board Option PD-123: $89**
Boost controller drive to 5 amps per phase. For two motors (eight drivers).

**Breakout Board Option BB-122: $19**
For easy connection of 2 motors. 3 ft. cable ends with screw terminal board.

### Stepper Motor Driver ST-143: $79

Stepper motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two stepper motors (12V, bidirectional, 4 phase, 350mA per phase).

**Special Package:** 2 motors (MO-103) + ST-143: **PA-181: $99**

### Stepper Motors MO-103: $15 or 4 for $39

Pancake type, 2¼" dia, ¼" shaft, 7.5°/step, 4 phase bidirectional, 300 step/sec, 12V, 36 ohm, bipolar, 5 oz-in torque, same as Airpax K82701-P2.

### Current Developments

Intelligent Voice Synthesizer, 14 Bit Analog to Digital converter, 4 Channel Digital to Analog converter, Counter Timer, Voice Recognition.

### A-BUS Adapters for:

| | |
|---|---|
| IBM PC, XT, AT and compatibles. Uses one short slot. | AR-133...$69 |
| Tandy 1000, 1000 EX & SX, 1200, 3000. Uses one short slot. | AR-133...$69 |
| Apple II, II+, IIe. Uses any slot. | AR-134...$49 |
| TRS-80 Model 102, 200 Plugs into 40 pin "system bus". | AR-136...$69 |
| Model 100. Uses 40 pin socket. (Socket is duplicated on adapter). | AR-135...$69 |
| TRS-80 Mod 3,4,4D. Fits 50 pin bus. (With hard disk, use Y-cable). | AR-132...$49 |
| TRS-80 Model 4P. Includes extra cable. (50 pin bus is recessed). | AR-137...$62 |
| TRS-80 Model I. Plugs into 40 pin I/O bus on KB or E/I. | AR-131...$39 |
| Color Computers (Tandy). Fits ROM slot. Multipak, or Y-cable. | AR-138...$49 |

### A-BUS Cable (3 ft, 50 cond.) CA-163: $24

Connects the A-BUS adapter to one A-BUS card or to first Motherboard.

**Special cable for two A-BUS cards: CA-162: $34**

### A-BUS Motherboard MB-120: $99

Each Motherboard holds five A-BUS cards. A sixth connector allows a second Motherboard to be added to the first (with connecting cable CA-161: $12). Up to five Motherboards can be joined this way to a single A-BUS adapter. Sturdy aluminum frame and card guides included.

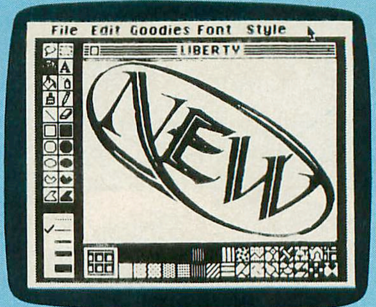
- The A-BUS is not a replacement for the Multi-pak

**Add $3.00 per order for shipping.**
**Visa, MC, checks, M.O. welcome.**
**CT & NY residents add sales tax.**
**C.O.D. add $3.00 extra.**
**Canada: shipping is $5**
**Overseas add 10%**

**ALPHA Products**
*a Sigma Industries Company*
*242-W West Avenue, Darien, CT 06820*

Technical info. **(203) 656-1806**
Orders only Except in CT **800 221-0916**
Connecticut orders: **(203) 348-9436**
All lines open weekdays 9 to 5 Eastern time

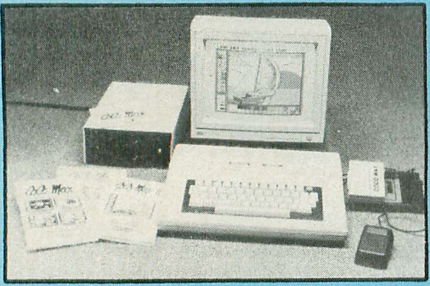
# CoCo Max™ II



## You'll use it all the time and love using it.

### What is CoCo Max ?

Simply the most incredible graphic and text creation "system" you have ever seen. A Hi-Res Input Pack (more on the pack later) is combined with high speed machine language software. The result will dazzle you.



*CoCo Max disk system, with Y-cable.*

### Is CoCo Max for you ?

Anyone who has ever held a pencil or a crayon for fun, school or business will love it. A 4 year-old will have fun doodling, a 15 year-old will do class projects and adults will play with it for hours before starting useful applications (illustrations, cards, artwork, business graphics, flyers, charts, memos, etc.) This is one of the rare packages that will be enjoyed by the whole family.

### What made CoCo Max an instant success ?

First there's nothing to learn, no syntax to worry about. Even a child who can't read will enjoy CoCo Max. Its power can be unleashed by simply ***pointing*** and ***clicking*** with your mouse or joystick. With ***icons*** and ***pull down menus,*** you control CoCo Max intuitively; it works the same way you think.

Don't be misled by this apparent simplicity. CoCo Max has more power than you thought possible. Its blinding speed will astound you.

It lets you work on an area 3.5 times the size of the window on the screen. It's so friendly that you will easily recover from mistakes: The ***undo*** feature lets you revert to your image prior to the mistake. As usual, it only takes a single click.

Later, we will tell you about the "typesetting" capabilities of CoCo Max II, but first let's glance at a few of its graphic creation tools:

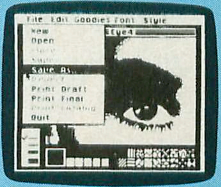
With the ***pencil*** you can draw free hand lines, then use the ***eraser*** to make corrections or changes. For straight lines, the convenient ***rubber-banding*** lets you preview your lines before they are fixed on your picture. It's fun and accurate. Lines can be of any width and made of any color or texture.

The ***paint brush,*** with its 32 selectable brush shapes, will adapt to any job, and make complicated graphics or calligraphy simple.

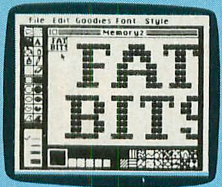
For special effects, the ***spray can*** is really fun: 86 standard colors and textures, all available at a click. It's like the real thing except the paint doesn't drip.

CoCo Max will instantly create many shapes: circles, squares, rectangles (with or without rounded corners), ellipses, etc. Shapes can be filled with any pattern. You can also add hundreds of custom patterns to the 86 which are included.

The ***Glyphics*** are 58 small drawings (symbols, faces, etc.) that can be used as rubber stamps. They're really great for enhancing your work without effort.



*Pull down menus*



*Zoom in !*

### Control Over Your Work

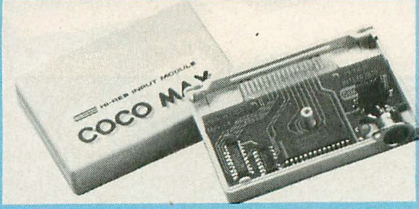
CoCo Max's advanced "tools" let you take any part of the screen, (text or picture) and perform many feats: • You can move it around • Copy it • Shrink or enlarge it in both directions • Save it on the electronic ***Clipbook*** • Flip it vertically or horizontally • Rotate it • Invert it • Clear it, etc. etc.

All this is done instantly, and you can always ***undo*** it if you don't like the results.

For detail work, the ***fat bits*** (zoom) feature is great, giving you easy control over each pixel.

To top it all, CoCo Max II works in color. Imagine the pictures in this ad in color. If you own a Radio Shack CGP-220 or CGP-115, you can even print your work in full color !

There is so much more to say, such as the capability to use CoCo Max images with your BASIC programs, the possibility to use CoCo Max's magic on any standard binary image file. There are also many advanced features such as the incredible ***lasso***.



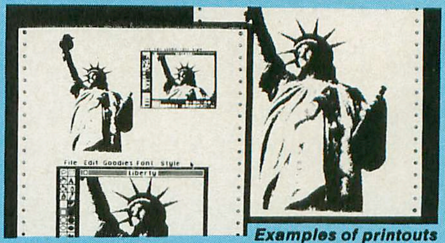
*Inside the Hi-Res Input Pack*

### Why a Hi-Res Input Pack ?

Did you know that the CoCo joystick input port can only access 4096 positions (64x64)? That's less than 10% of the Hi-Res screen, which has 49152 points! (256x192). You lose 90% of the potential. The Hi-Res Input Pack distinguishes each of the 49152 distinct joystick or mouse positions. That's the key to CoCo Max's power. The pack plugs into the rom slot (like a rom cartridge). Inside the pack is a high speed multichannel analog to digital converter. Your existing joystick or mouse simply plugs into the back of the Hi-Res Pack.

### Electronic Typesetting...

You'll be impressed with CoCo Max's capability. Text can be added and moved around anywhere on the picture. (You can also rotate, invert and flip it...) At a click, you can choose from 14 built in ***fonts*** each with 16 variations. That's over 200 typestyles !


File Edit Goodies Font Style
Liberty

*Examples of printouts*

### Printing Your Creations

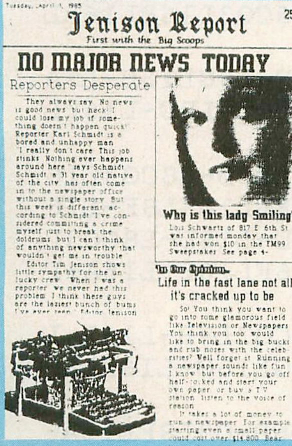
There are a dozen ways to print your work. All are available with a click of your joystick (or mouse) without exiting CoCo Max. Your CoCo Max disk includes drivers for over 30 printers !

All the CoCo Max pictures are **unretouched** screen shots or printouts (Epson RX-80).

# CoCo Max II™

## The whole family will enjoy CoCo Max. Here are a few examples of the possibilities.

All these pictures are **unretouched** screen photos or printouts (on an Epson RX-80).



Tuesday, April 1, 1985

Jenison Report 25¢

First with the Big Scoops

NO MAJOR NEWS TODAY

Reporters Desperate

They always say No news is good news but heck! I could lose my job if something doesn't happen quick! Reporter Karl Schmidt is a bored and unhappy man "I really don't care. This job stinks. Nothing ever happens around here" says Schmidt. Schmidt, a 31 year old native of the city, has often come in to the newspaper office without a single story. But this week is different according to Schmidt "I've considered committing a crime myself just to break the doldrums but I can't think of anything newsworthy that wouldn't get me in trouble"

Editor Tim Jenison shows little sympathy for the unlucky crew. "When I was a reporter we never had this problem. I think these guys are the laziest bunch of bums I've ever seen" Editor Jenison

Why is this lady Smiling?

Lois Schwartz of 817 E 6th St was informed monday that she had won $10 in the FM99 Sweepstakes. See page 4-

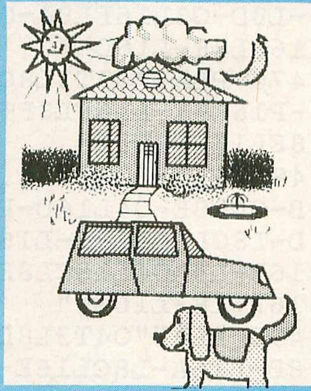
In Our Opinion...

Life in the fast lane not all it's cracked up to be

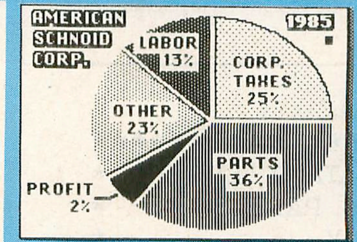
So! You think you want to go into some glamorous field like Television or Newspapers. You think you too would like to bring in the big bucks and rub noses with the celebrities? Well forget it. Running a newspaper sounds like fun I know but before you go off half-cocked and start your own paper or buy a T.V. station listen to the voice of reason.

It takes a lot of money to run a newspaper. For example starting even a small paper could cost over $14,800. Bear

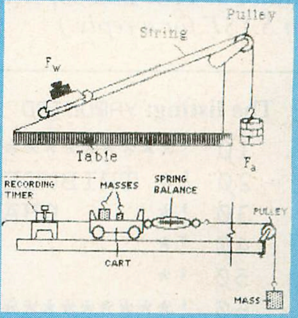
❶ ***Publish a newsletter or bulletin***



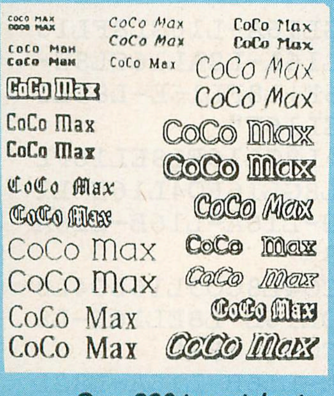
❷ ***Fun for children while stimulating creativity.***



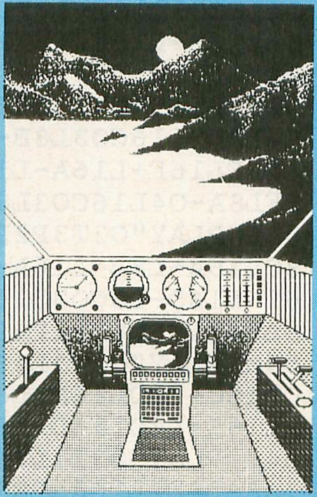
❸ ***Business graphs, charts, diagrams. Also memos***



❹ ***Junior's homework and science projects. Term papers too !***

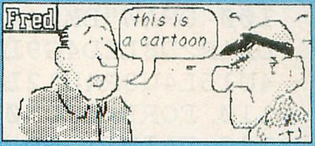


❺ ***Over 200 typestyles to choose from ! generate flyers.***

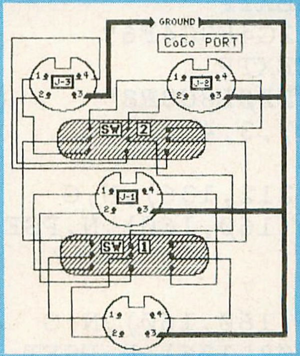


❻ ***A new way to express your imagination.***

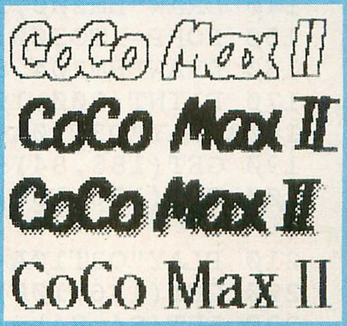
❼ ***Video portrait (with optional digitizer).***



❽ ***This is a cartoon.***



❾ ***schematics and floor plans.***



❿ ***Logos and letterheads.***

# CoCo Max II now works with the CoCo 3

**The new CoCo Max II has exactly the same features and resolution (256 x 192) as the original CoCo Max II**

## System Requirements:

Any 64K CoCo and a standard joystick or mouse. (Koala pads and track balls work, but are not recommended.) Disk systems need a Multi-Pak or our Y-Cable. CoCo Max is compatible with any Radio Shack DOS & ADOS.

Note: the tape version of CoCo Max includes almost all the features of CoCo Max II except *Shrink, Stretch, Rotate*, and *Glyphics*. Also, it has 5 fonts instead of 14.

CoCo Max is not compatible with JDOS, DoubleDOS, MDOS, OS-9, the X-pad, and Daisy Wheel Printers.

## Printers Supported:

Epson MX, RX, FX and LX series, Gemini, Star, Micronix, Delta 10, 10X, 15, 15X, SG-10, Okidata 82A, 92, 93, C. Itoh Pro-writer, Apple Image-writer, Hewlett-Packard Thinkjet, Radio Shack DMP 100, 105, 110, 120, 200, 400, 500, Line Printer 7, Line Printer 8, TRP-100, CGP-220, (DMP-130 use Line Printer VIII), PMC printers, Gorilla Banana.
Color printing: CGP-200, CGP-115

## New Video Digitizer DS-69B

This Low Cost Digitizer is the next step in sophistication for your CoCo Max system. With the DS-69B you will be able to digitize and bring into CoCo Max a frame from any video source, such as your VCR, tuner, or video camera.

Works with any CoCo, 8 frames per second.

Includes software on disk ............ $149.95

## Guaranteed Satisfaction

**Use CoCo Max for a full month. If you are not delighted with it, we will refund every penny.**

## Pricing

CoCo Max on tape ............. $69.95
with Hi-Res Pack and manual.
CoCo Max II (on disk only) ...... $79.95
with Hi-Res Pack and manual.

Upgrade to make CoCo Max II compatible with the CoCo 3: Send your CoCo Max Hi-Res Pak (the cartridge) to us. We will modify it and return it to you. Enclose payment of $29.95

Y-Cable: *Special Price*........... $19.95
Super Picture Disks #1, #2, and #3 each: $14.95
All three picture disks........... $29.95

---

**Add $3.00 per order for shipping.**
**Visa, MC, checks, M.O. welcome.**
**CT & NY residents add sales tax.**
**C.O.D. add $3.00 extra.**
**Canada: shipping is $5**
**Overseas add 10%**

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All lines open weekdays 9 to 5 Eastern time

Upon running the program, a saxophone appears in the lower-right corner of the screen. Some musical notes appear, going from right to left, and then the music begins. If you want to hear the piece again, just press any key. New notes are displayed and "Donnalee" is repeated. Enjoy!

*(Questions about this program may be directed to the author at P.O. Box 86, Red Oak, GA 30272. Please enclose an SASE for a reply.)* □

**The listing:** YARDBIRD

```
 10 '****************************
 20 '* TRIBUTE TO JAZZ LEGEND *
 30 '*     CHARLIE PARKER     *
 40 '*           BY           *
 50 '*       VAL BURKE        *
 60 '****************************
 70 POKE65495,0
 80 PMODE3,1:PCLS2:SCREEN1,0
 90 DIM N(12,26)
100 DRAW"BM244,100F4L16D22R2D6L2
D24R2D8L2D4G8L24H8U28R20D16F4R8E
4U16L4U8R4U12L4U8R4U8E4R12"
110 FORP=1TO500:NEXTP
120 PAINT(200,156),3,4
130 FORP=1TO500:NEXTP
140 DRAW"BM200,112G4F8G4F6"
150 FORP=1TO500:NEXTP
160 DRAW"BM204,88D20L8U8R8"
170 PAINT(200,104),3,4
180 PLAY"O3T10A-"
190 GET(188,84)-(212,136),N,G
200 PUT(136,108)-(160,160),N,PSE
T
210 PLAY"O2T10A-"
220 GET(136,108)-(160,160),N,G
230 PUT(84,84)-(108,136),N,PSET
240 PLAY"O2T10A-"
250 GET(84,84)-(108,136),N,G
260 PUT(32,108)-(56,160),N,PSET
270 PLAY"O3T10A-"
280 DRAW"BM232,40D20L8U8R8"
290 PAINT(228,56),4,4
300 DRAW"BM240,68H4D12L4U4R4"
310 PAINT(234,74),1,4
320 PLAY"O4T10A-"
330 FORP=1TO200:NEXTP
340 GET(220,36)-(244,88),N,G
350 PUT(156,12)-(180,64),N,PSET
360 PLAY"O4T10A-"
370 FORP=1TO200:NEXTP
380 GET(156,12)-(180,64),N,G
390 PUT(92,20)-(116,72),N,PSET
400 PLAY"O3T10A-"
410 GET(92,20)-(116,72),N,G
420 PUT(20,12)-(44,64),N,PSET
430 PLAY"O4T10A-":FORP=1TO200:NE
XTP
440 POKE65494,0
450 PLAY"O4T3L16GL16A-L16GL8FL16
E-L8D-L16CO3L8B-L16A-L8AL16CL8E-
L16FL16F+L16A-L16F+L8FL16E-L8DL1
6FL8A-O4L16CO3L8GL16F"
460 PLAY"O3T3P2P4P8L8EL16DL8E-O2
L16AL8B-O3L16D-L8FL16A-O4L8CL16E
-L8D-O3L16FL8A-O4L16CO3L16BL16BL
16EL8E-L16D-"
470 PLAY"O3T3L8CL16E-L8GL16B-L8A
-P16L8E-L16FL8F+L16B-O4L8D-L16FL
8EL16CP8P16"
480 PLAY"O4T3L4..E-L16D-L8CO3L16
B-O4L8E-O4L16D-P4L8F+L16EL8E-L16
D-L8CL16CL8D-L16DL8E-L16D-L8CO3I
16B-L8AO4L16CL8E-L16FL16F+L16A-I
16F+L8FL16E-"
490 PLAY"O4T3L8DL16CO3L8B-L16A-I
8B-L16A-L8CL16E-L16GL16G-L16FL8E
P2"
500 PLAY"O4T3L8E-L16D-O3L8FL16A-
O4L8CO3L16B-L8FL16A-L8GL16B-O4L8
D-L16E-L16EL16F+L16EL8E-L16D-L8C
P4"
510 PLAY"O4T3L16GL16A-L16GL8FL16
E-L8D-L16CO3L8B-L16A-L8AL16CL8E-
L16FL16F+L16A-L16F+L8FL16E-L8DL1
6FL8A-O4L16CO3L8GL16F"
520 PLAY"O3T3P2P4L8GL16FL8EL16FI
8GL16A-L8B-L16A-L8GL16FO4L16D-L1
6E-L16D-L8CO3L16B-L16A-L16B-L16A
-L8GL16EL8FP1P4P8"
530 PLAY"O3T3L16CO4L8CO3L16BO4L8
CL16C+L8DL16D-L8DL16E-L8EL16E-L8
EL16E-L8DL16D-L8CO3L16B-"
540 PLAY"O3T3L16A-L16B-L16A-L8GL
16A-L8B-L16A-L8GL16FO2L8BO3L16DL
8FL16A-L8BO4L16GL8FL16EL8E-L16D-
L8CO3L16B-L8AL16F+L8FL16E-L8DL16
FL8A-O4L16CO3L8B-L16A-L8GL16B-L1
6.A-P1P2"
550 CLS:PRINT@206,"OUCH!!":PRINT
@233,"<PRESS ANY KEY>":PRINT@262
,"AND I'LL PLAY IT AGAIN"
560 I$=INKEY$
570 IFI$=""THEN560
580 PMODE3,1:PCLS:SCREEN1,1
590 CIRCLE(128,96),30
600 LINE(158,12)-(158,96),PSET
610 PAINT(128,96),6,8
620 FORP=1TO500:NEXTP
630 CIRCLE(208,124),20
640 DRAW"BM248,80H20D58"
650 PAINT(208,124),7,8
660 FORP=1TO500:NEXTP
670 CIRCLE(48,56),20
680 DRAW"BM88,20H20D56"
690 PAINT(48,56),8,8
700 GOTO 440
```

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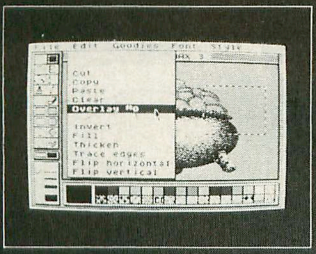
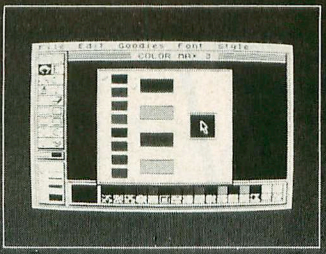

File Edit Goodies Font Style
COLOR MAX 3
Cut
Copy
Paste
Clear
Overlay
Invert
Fill
Thicken
Trace edges
Flip horizontal
Flip vertical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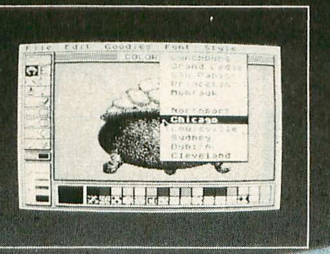
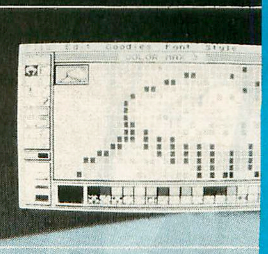
COLOR MAX 3


File Edit Goodies Font Style
Chicago
Sydney
Cleveland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# INTRODUCING

# COLOR MAX 3

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Unleash the power of your CoCo 3 with 320 x 200 screen resolution, and the choice of any 16 colors from the CoCo 3's 64 color palette, and your graphic creations almost can't help but come alive with color and detail. Icons, pull down menus, and dialog boxes make COLOR MAX 3 very easy to use. 11 fonts are supplied, making hundreds of lettering styles possible. Text can use any combinations of color, shadow, outline, bold, and italics. Painting is a snap with 16 colors and 32 editable patterns. COLOR MAX 3 requires a 128K CoCo 3 with disk drive, High-Resolution Joystick interface, and a joystick device (mouse, touch pad, or joystick).

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| | |
|---|---|
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220MD Color Max 3 Pix Converter 1
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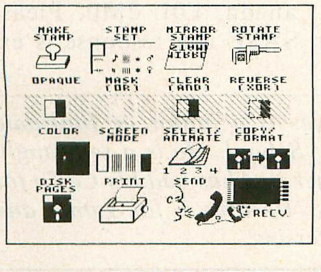
**Many additional features**, operating hints, hardware mod's and suggestions, etc. Requires 64K CoCo, 1 disk drive, and 2 analog joysticks

**Order Catalog# 111GD, See RAINBOW REVIEW (4/84 on page 225)**

**GRAPHICOM DISK .......... $24.95**


MAKE STAMP
STAMP SET
MIRROR STAMP
ROTATE STAMP
OPAQUE
MASK (OR)
CLEAR (AND)
REVERSE (XOR)
COLOR
SCREEN MODE
SELECT/ ANIMATE
COPY/ FORMAT
1 2 3 4
DISK PAGES
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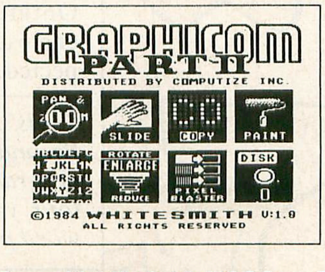
GRAPHICOM
PART II
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PAINT
ROTATE
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REDUCE
PIXEL BLASTER
DISK
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**HARDCOPY** requires a 64K CoCo (I, II, or III) and disk drive. Please specify printer and catalog # when ordering.

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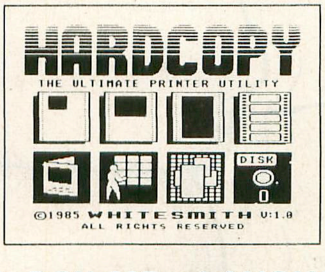
**HARDCOPY DISK ........... $29.95**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THE ULTIMATE PRINTER UTILITY
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**COLORSCAN** will print program listings in blazing color. Help create colorful banners up to 55 inches in length, produce 1x1/2x2 or poster printout of your favorite 6K graphic disk files.

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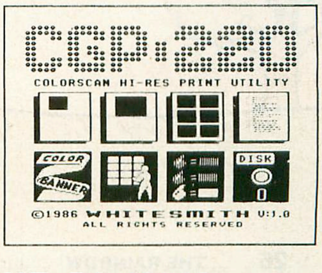
CGP-220
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16K ECB

# AIR RESCUE

### By Chris Keyes

This is a game requiring skill, timing and a lot of luck. *Balloon* is in machine language and only requires 16K. It will work on any CoCo including the CoCo 3. Your mission is to travel to the enemy base and rescue the innocent hostages. They were kidnapped by the dastardly dictator of the evil country, Litko. Your job is to maneuver your sleek hot-air balloon up and down, dodging bullets coming from both sides. During this, you must try to rescue as many hostages and destroy as many enemy tanks as possible.

Use the right joystick to move, and press the firebutton to launch bombs. Hitting a tank with a bomb scores 50 points and rescuing a hostage scores 100 points. To rescue someone, be just above the ground as he passes underneath you. Once you've been hit by a bullet, the game ends.

To create this machine language program, type in Listing 1 (`POKE1`) and save it to tape or disk. Then type in Listing 2 (`POKE2`) and save it to tape or disk. Now reload Listing 1 and run it. If it was typed in correctly, you will be prompted to load and run Listing 2. If this program was typed in correctly, you will be prompted on how to save the program. Simply type `(C)SAVEM "BALLOON",13997,15882,13997`.

A word of warning: Keep on the move. If you just sit near the bottom sneakily trying to gobble up points, odds are the left gun will trap you and you will be killed.

Any comments, questions or suggestions are welcome. My address is P.O. Box 399, St. Johns Road, Stroud, Ontario, Canada, L0L 2M0. Please enclose an SASE if a response is expected. ☐

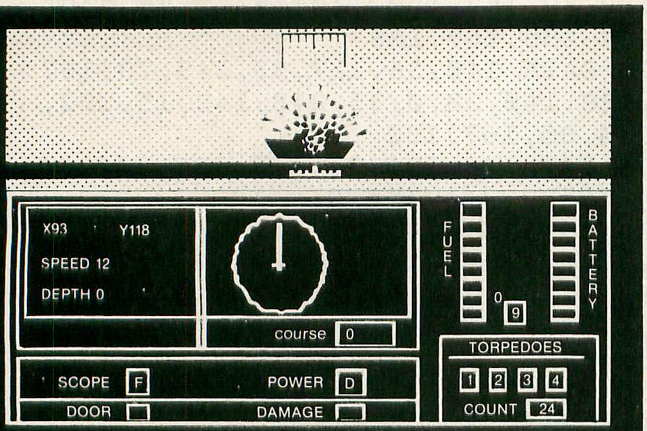
*Chris Keyes is a junior at Innisdale Secondary School. He is a self-taught programmer and has had his CoCo for four years. He uses it for games and word processing.*

| | |
|---|---|
| 19 | 228 |
| 27 | 218 |
| 38 | 13 |
| 47 | 159 |
| 56 | 249 |
| END | 171 |

**Listing 1:** POKE1

```
1 '*****************************
2 '****** BALLOON ATTACK ******
3 '************ BY ************
4 '******** CHRIS KEYES *******
5 '*****************************
6 '
7 FORX=13997 TO 14999
8 READ A
9 POKE X,A
10 TT=TT+A
11 NEXT X
12 CLS:IF TT<>121960 THEN PRINT"
DATA WAS ENTERED INCORRECTLY.":P
RINT"RECHECK YOUR DATA LINES.":S
TOP
13 CLS:PRINT"PROCESS COMPLETED."
:PRINT"LOAD 'POKE2' AND TYPE <RU
N>."
14 DATA 189,169,40,142,4,0,134,1
59,167,128,140,6,0,37,249,142,4,
0,134,191,167,128,140
15 DATA 4,32,37,249,142,5,224,16
7,128,140,6,0,37,249,142,4,0,167
,132,48
16 DATA 136,32,140,5,224,35,246,
142,4,31,167,132,48,136,32,140,5
,255,35,246
17 DATA 142,5,133,16,142,61,171,
198,20,166,160,167,128,90,38,249
,142,4,73,16
18 DATA 142,61,191,198,14,166,16
0,167,128,90,38,249,142,4,172,16
,142,61,205,198
19 DATA 7,166,160,167,128,90,38,
249,134,66,183,4,206,134,89,183,
4,207,142,4
20 DATA 237,16,142,61,212,198,5,
166,160,167,128,90,38,249,142,5,
13,16,142,61
21 DATA 217,198,5,166,160,167,12
8,90,38,249,134,159,183,4,80,183
,5,138,183,5
22 DATA 140,183,5,144,183,5,147,
173,159,160,0,39,250,142,4,0,134
,32,167,128
23 DATA 140,6,0,37,249,142,4,0,1
6,142,61,141,198,30,166,160,167,
128,90,38
24 DATA 249,173,159,160,0,39,250
,129,57,34,246,129,48,37,242,128
,48,198,255,61
25 DATA 31,1,191,62,3,183,255,20
3,183,255,192,183,255,195,183,25
5,197,183,255,199
26 DATA 134,253,183,255,34,142,1
4,0,79,167,128,140,15,63,35,249,
134,255,167,128
27 DATA 140,36,127,35,249,79,167
,128,140,38,0,35,248,142,15,192,
134,85,167,132
28 DATA 48,136,31,167,128,140,36
,128,37,244,134,240,183,33,254,1
83,34,126,134,224
29 DATA 183,34,30,183,34,94,79,1
83,34,62,204,60,102,195,0,56,253
,61,226,204
30 DATA 60,158,195,0,56,253,61,2
30,204,60,218,195,0,30,253,61,23
4,142,26,16
31 DATA 191,61,224,142,34,61,191
,61,252,142,15,193,191,61,236,12
7,61,239,127,61
32 DATA 247,127,61,251,127,61,25
4,127,61,244,142,0,0,191,61,222,
22,0,140,190
33 DATA 61,224,16,142,60,102,166
,160,167,128,166,160,167,132,48,
136,31,16,188,61
34 DATA 226,37,239,22,0,209,190,
61,228,16,142,60,158,198,15,166,
160,167,128,166
35 DATA 160,167,128,166,160,167,
128,166,160,167,128,48,136,28,90
,38,234,32,80,182
36 DATA 255,1,132,247,183,255,1,
182,255,3,132,247,183,255,3,182,
255,35,138,8
37 DATA 183,255,35,16,190,62,10,
190,62,5,166,128,132,252,183,255
,32,246,62,9
38 DATA 90,38,253,188,62,7,38,23
8,49,63,38,231,57,190,61,232,16,
142,60,218
39 DATA 166,160,167,128,166,160,
167,132,48,136,31,16,188,61,234,
37,239,32,0,190
40 DATA 62,3,48,137,7,208,48,31,
38,252,173,159,160,10,182,1,91,1
29,15,37
41 DATA 7,129,45,34,10,22,255,87
,134,1,183,61,238,32,5,134,2,183
,61,238
42 DATA 182,61,238,129,2,39,25,2
52,61,224,131,0,64,253,61,224,16
,131,15,207
43 DATA 16,46,255,51,195,0,64,25
3,61,224,32,46,252,61,224,195,0,
64,253,61
44 DATA 224,16,131,31,113,16,45,
```

# Four new programs for the CoCo



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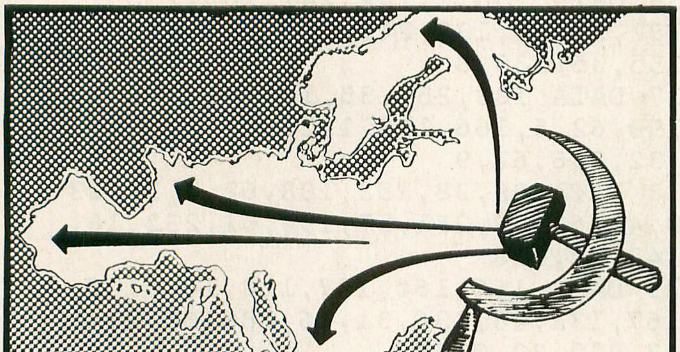
**System requirements: CoCo III computer, disk drive. $32.00**



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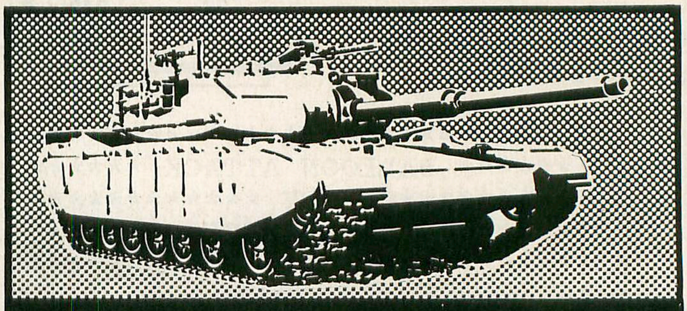

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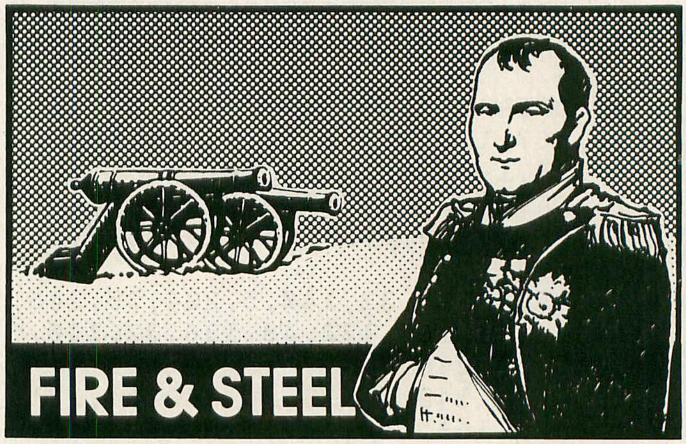
You become General Von Paulus in command of the German Sixth Army consisting of Panzers, Infantry, Mechanized Units, with support from Bombers and Fighters of the dreaded Luftwaffe. Starting in the summer of 1942 you begin your offensive knowing that you have only so much time to take control of the city and then defend it from overwhelming Russian counterattack. **Completely high resolution graphics for ECB 64K CoCo I, II, III disk or tape. Colorless on RGB monitors. $28.00**



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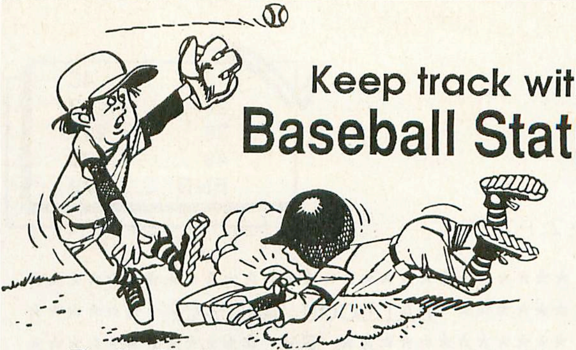
```
255,26,131,0,64,253,61,224,190,6
1,224,140,30
45 DATA 250,37,15,182,61,244,39,
10,190,61,232,140,34,176,16,39,2
,56,182,61
46 DATA 239,38,33,182,255,0,129,
126,39,6,129,254,16,38,0,170,134
,1,183,61
47 DATA 239,252,61,224,195,3,192
,253,61,240,195,1,0,253,61,242,1
90,61,240,134
48 DATA 255,167,132,48,136,32,18
8,61,242,35,246,190,61,240,48,13
6,64,191,61,240
49 DATA 190,61,242,48,136,64,140
,36,111,34,109,191,61,242,166,13
2,129,255,39,5
50 DATA 182,61,244,39,21,190,61,
240,16,142,60,253,166,160,167,13
2,48,136,32,188
51 DATA 61,242,37,244,32,80,190,
61,222,198,50,58,191,61,222,142,
0,1,191,62
52 DATA 10,134,95,183,62,9,142,1
32,208,191,62,5,142,136,184,191,
62,7,23,254
53 DATA 170,190,61,228,134,255,1
98,15,167,128,167,128,167,128,16
7,128,48,136,28,90
54 DATA 38,242,247,61,254,190,61
,240,134,255,198,8,167,132,48,13
6,32,90,38,248
55 DATA 79,183,61,239,32,0,190,6
1,236,134,255,198,5,167,132,48,1
36,32,90,38
56 DATA 248,190,61,236,188,61,22
4,34,8,48,136,32,191,61,236,32,6
,48,136,224
57 DATA 191,61,236,16,142,60,248
,198,5,166,160,167,132,48,136,32
,90,38,246,182
58 DATA 61,247,39,60,134,255,190
,61,245,167,128,191,61,245,166,1
32,129,255,39,20
59 DATA 52,2,252,61,224,195,3,19
2,253,61,255,188,61,255,16,37,1,
91,53,2
60 DATA 79,167,132,182,61,248,74
,39,5,183,61,248,32,31,79,183,61
,247,134,255
61 DATA 167,132,32,21,134,1,183,
61,247,190,61,236,48,136,97,191,
61,245,134,28
62 DATA 183,61,248,32,175,182,61
,251,39,58,134,255,190,61,249,16
7,132,48,31,191
63 DATA 61,249,166,132,129,255,3
9,20,52,2,252,61,224,195,3,192,2
53,61,255,188
```



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```
18 ........46
26 ........92
38 .......217
46 .......135
END .....179
```

**Listing 2:** POKE2

```
1 '*******************************
2 '****** BALLOON ATTACK ******
3 '************ BY ************
4 '******** CHRIS KEYES *******
5 '*******************************
6 FORX=15000 TO 15882
7 READ A
8 POKE X,A
9 TT=TT+A
10 NEXTX
11 CLS:IF TT<>98481 THENPRINT"DA
TA WAS ENTERED INCORRECTLY.":PRI
NT"RECHECK DATA LINES.":STOP
12 CLS:PRINT"PROCESS COMPLETE.":
PRINT"NOW TYPE:":PRINT:PRINT"(C)
SAVEM 'BALLOON',13997,15882,1399
7"
13 DATA 61,255,16,37,1,3,53,2,79
,167,132,140,34,34,39,2,32,23,79
,183
14 DATA 61,251,134,255,167,132,3
2,13,134,1,183,61,251,190,61,252
,191,61,249,32
15 DATA 185,182,61,254,38,40,182
,61,244,38,84,182,1,19,129,100,3
7,14,134,1
16 DATA 183,61,254,142,34,186,19
1,61,228,22,253,102,134,1,183,61
,244,142,34,188
17 DATA 191,61,232,22,253,175,18
2,62,1,38,103,134,1,183,62,1,190
,61,228,198
18 DATA 255,134,15,231,128,231,1
28,231,128,231,128,48,136,28,74,
38,242,190,61,228
19 DATA 48,31,140,34,161,16,39,0
,51,191,61,228,22,253,39,182,62,
2,38,60
20 DATA 134,1,183,62,2,190,61,23
2,198,255,134,15,231,128,231,132
,48,136,31,74
21 DATA 38,246,190,61,232,48,31,
140,34,161,16,39,0,13,191,61,232
,22,253,81
22 DATA 79,183,61,254,22,253,100
,79,183,61,244,22,253,93,127,62,
1,22,253,87
23 DATA 127,62,2,22,253,81,190,6
1,222,198,100,58,191,61,222,142,
0,1,191,62
24 DATA 10,134,50,183,62,9,142,2
53,232,191,62,5,142,254,226,191,
62,7,23,252
25 DATA 222,134,255,142,34,176,1
98,15,167,128,167,132,48,136,31,
90,38,246,79,183
26 DATA 61,244,22,254,73,142,0,5
0,191,62,10,134,4,183,62,9,142,1
28,232,191
27 DATA 62,5,142,130,120,191,62,
7,23,252,172,182,255,1,132,247,1
83,255,1,182
28 DATA 255,3,132,247,183,255,3,
182,255,35,138,8,183,255,35,79,1
42,15,64,16
29 DATA 142,37,224,198,32,167,12
8,167,160,134,40,74,38,253,79,90
,38,243,49,168
30 DATA 192,16,140,25,200,34,232
,189,169,81,79,183,255,196,183,2
55,194,183,255,192
31 DATA 183,255,202,183,255,198,
182,255,34,132,7,183,255,34,134,
128,142,4,0,167
32 DATA 128,140,6,0,37,249,142,6
1,5,16,142,4,0,166,128,167,160,1
40,61,22
33 DATA 38,247,142,61,22,16,142,
```

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```
4,64,166,128,167,160,140,61,44,3
8,247,134,85
34 DATA 151,137,252,61,222,189,1
89,204,142,61,45,16,142,4,128,16
6,128,167,160,140
35 DATA 61,141,38,247,173,159,16
0,0,39,250,129,89,16,39,250,253,
79,151,113,189
36 DATA 160,39,255,255,255,255,2
54,255,240,31,226,143,202,167,13
8,163,170,171,170,171
37 DATA 42,169,170,171,170,171,1
38,163,202,167,194,135,208,53,22
2,247,238,239,236,111
38 DATA 224,15,229,79,228,79,228
,79,229,79,224,15,255,255,255,25
5,255,255,255,248
39 DATA 3,255,0,7,253,255,127,24
7,253,255,0,7,253,255,255,247,25
3,255,224,7
40 DATA 252,3,239,255,255,251,23
9,255,255,251,224,0,0,3,232,227,
199,139,215,93
41 DATA 187,117,183,93,187,118,2
15,93,187,117,232,227,199,139,24
0,0,0,7,255,127
42 DATA 252,31,252,159,249,79,25
3,223,252,31,207,121,247,119,248
,15,255,127,255,127
43 DATA 255,127,254,183,253,223,
243,231,15,7,0,7,15,126,126,195,
195,195,195,231
44 DATA 231,42,42,42,32,71,65,77
,69,32,79,86,69,82,32,42,42,42,8
9,79
45 DATA 85,82,32,70,73,78,65,76,
32,83,67,79,82,69,32,87,65,83,32
,58
46 DATA 32,42,42,42,42,42,42,42,
42,42,42,42,42,42,42,42,42,42,42
,42
47 DATA 42,42,42,42,42,42,42,42,
42,42,42,42,42,87,65,78,84,32,84
,79
48 DATA 32,80,76,65,89,32,65,71,
65,73,78,63,32,40,89,47,78,41,32
,32
49 DATA 32,32,32,32,32,42,42,42,
42,42,42,42,42,42,42,42,42,42,42
,42
50 DATA 42,42,42,42,42,42,42,42,
42,42,42,42,42,42,42,42,42,87,72
,73
51 DATA 67,72,32,76,69,86,69,76,
32,40,48,61,72,65,82,68,32,45,32
,57
52 DATA 61,69,65,83,89,41,63,80,
82,69,83,83,32,65,32,75,69,89,32
,84
53 DATA 79,32,83,84,65,82,84,66,
65,76,76,79,79,78,32,65,84,84,65
,67
54 DATA 75,87,82,73,84,84,69,78,
67,72,82,73,83,75,69,89,69,83,1,
44
55 DATA 27,208,60,158,34,176,60,
214,34,182,60,248,29,1,1,1,33,80
,34,80
56 DATA 1,30,80,1,15,34,39,1,34,
61,0,31,144,1,0,6,249,128,232,13
0
57 DATA 120,4,0
```

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# The Role of Teachers in Educational Software Development

### By Michael Plog, Ph.D.
### Rainbow Contributing Editor

Almost everyone will agree that education needs high quality software specifically designed for student learning experiences. The problem, however, is obtaining such software. Many software packages are written by elementary and secondary teachers. Naturally, that is viewed as a good thing — we want software developed by people who are on the "front line" of education. However, there are a few drawbacks to this situation.

Most elementary and secondary teachers cannot get released time to devote to software development. After all, there are classes to teach, lunch rooms to supervise, playgrounds to monitor, committee meetings to attend, papers to grade after school, and parents to meet with. These regular duties leave little time to spend on "unessential" activities such as software development. So, of all the teachers who have the talent and capability to write educational software, only a small proportion of them will actually sit in front of their machines to face the difficult task of writing software.

Those teachers who do spend the time are not facing an easy task. Preparing software for the classroom of a total stranger is considerably different from preparing it to use in your own classroom. Creating a commercially acceptable piece of educational software goes well beyond simply putting good ideas in electronic form. A commercial software package for education must not only be good, it must be user-friendly, since it may be operated by a person with no knowledge of computers — perhaps even by a teacher who does not like computers.

So, while it would be beneficial to have software developed by elementary and secondary teachers, we shouldn't expect a large amount of such material to be available. It places too many unreasonable demands on teachers.

Who else is left? Well, commercial firms are now getting into the act with software sold like (and often with) books at educational conferences. Companies seldom maintain writers on payroll, though. They usually contract with people to prepare hard copy and electronic materials for sale. Some of these people are elementary and secondary teachers; however, the majority of authors of books and commercial software are university professors.

This makes a lot of sense. Universities are designed to produce a reflective atmosphere, where scholarly inquiry can be pursued. Ideas are debated among leaders in all fields of knowledge, so that resulting products represent the most careful considerations and are as accurate as possible. We have come to expect most educational materials to be developed at universities, but we need to consider the limitations of such an environment.

People who teach in universities are ranked in order of importance. At most universities, ranks go in the order (from lowest to highest) of assistant professor, associate professor and full professor. Moving up in rank has several important benefits for university teachers. Perhaps the most significant one is tenure, which guarantees a person cannot be fired unless there is just cause. An assistant professor can be released from employment for any reason at all. In most universities, a professor who is promoted to associate will get tenure. This means more than an increase in pay; it means job security. To fire an associate professor requires just cause, and the reasons need to be very good!

To get promoted, professors are measured in three areas: teaching, service and scholarship (or research). Teaching needs little explanation; the professor must conduct classes and have students demonstrate some knowledge of the course content. The service component can take many forms, from participation on university committees to active involvement in professional organizations. Scholarship, however, is often the key to determining tenure.

University professors can demonstrate scholarship by several means. The most common is to have articles published in professional periodicals or make presentations at professional meetings. Publishing a book that is well-received by experts is an almost certain guarantee of demonstration of scholarship.

This lengthy diversion into academic rank and promotion policies has a

---

*Michael Plog received his doctorate degree from the University of Illinois. He has taught social studies in high school, worked in the central office of a school district and is currently employed at the Illinois State Board of Education.*

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Signature ____________ Card Expiration Date ______ purpose. We may be disappointed if we expect large quantities of high quality educational software from university professors. Full professors, of course, can get involved in anything they want — they cannot be promoted any higher. Full professors, however, tend to be older and may have less interest in computers. It is from the ranks of assistant and associate professors that we should expect most educational software.

> ***"Publication of a state-of-the-art textbook is usually counted as research at tenure time, so why isn't publication of software?"***

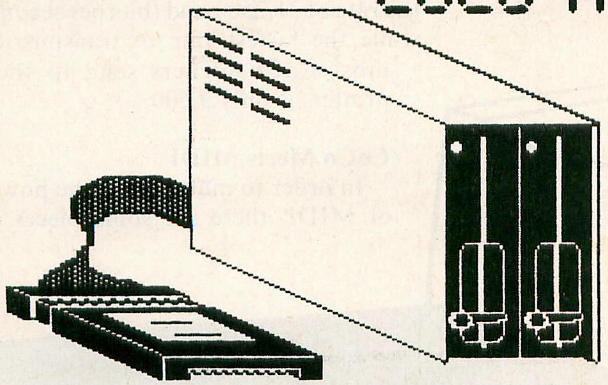
Ah, there's the rub. In the criteria for promotion of teaching, service and scholarship, where does development of computer software lie? It might be considered teaching, especially if software is developed for the professor's class. It might even be considered service, providing something of value to elementary or secondary education. In many institutions, software development is not considered research — and of the three criteria, research is the most prestigious and the most important in tenure and promotion decisions.

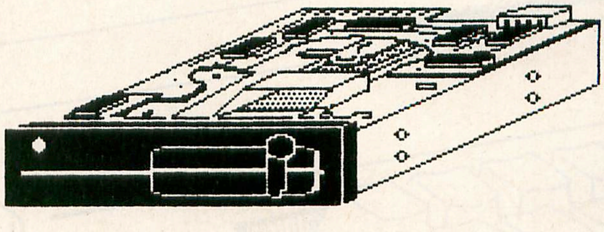
Many younger faculty members — the ones who have had the most experience with computing during their own years in college — say they are being advised to forget about writing software or incorporating computers into their courses, at least until after they have tenure. They are being told instead to spend time doing research and getting it published. This means talented people are being discouraged from developing educational software, so less quality educational software will be on the market. I do not believe all quality software has to come from universities, but I am saddened that such a pool of talent is not spending more time developing software specifically designed for educational use.

Of course, not all colleges and universities have a low opinion of educational software as scholarly research. Depending on the particular institution, educational software has been viewed favorably by tenure and promotion committees. Faculty members who have written software claim it often has a large research component. Writing software, they argue, should be considered the same as writing a textbook to be used in schools. Publication of a state-of-the-art textbook is usually counted as research at tenure time, so why isn't publication of software?

The use of computers in education has extended in directions we could not have predicted a few years ago. Educators once wondered if computers would be a fad in school, used only for games to keep students occupied while others finished their work. The emergence of the tenure question at the university level is an indication that computers will continue to make a significant impact on schools. The educational computer revolution is not as simple as teaching students how to program in BASIC — and the revolution is not over yet!

Until next month, keep the revolution going. I welcome all comments, complaints, or suggestions. My address is 829 Evergreen, Chatham, IL 62629.





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# Uncovering the MIDI Section

Imagine your CoCo playing real music. Lead lines, bass lines, even drums, and doing it all at the same time. This is the exciting new world of MIDI (Musical Instrument Digital Interface).

---

*John Mueller teaches both band and choir in a small school district in Oregon. He and his wife, Nannette (who also teaches music), have used their CoCo to provide music for many functions, from her brother's wedding to a junior high production of* The Mikado.

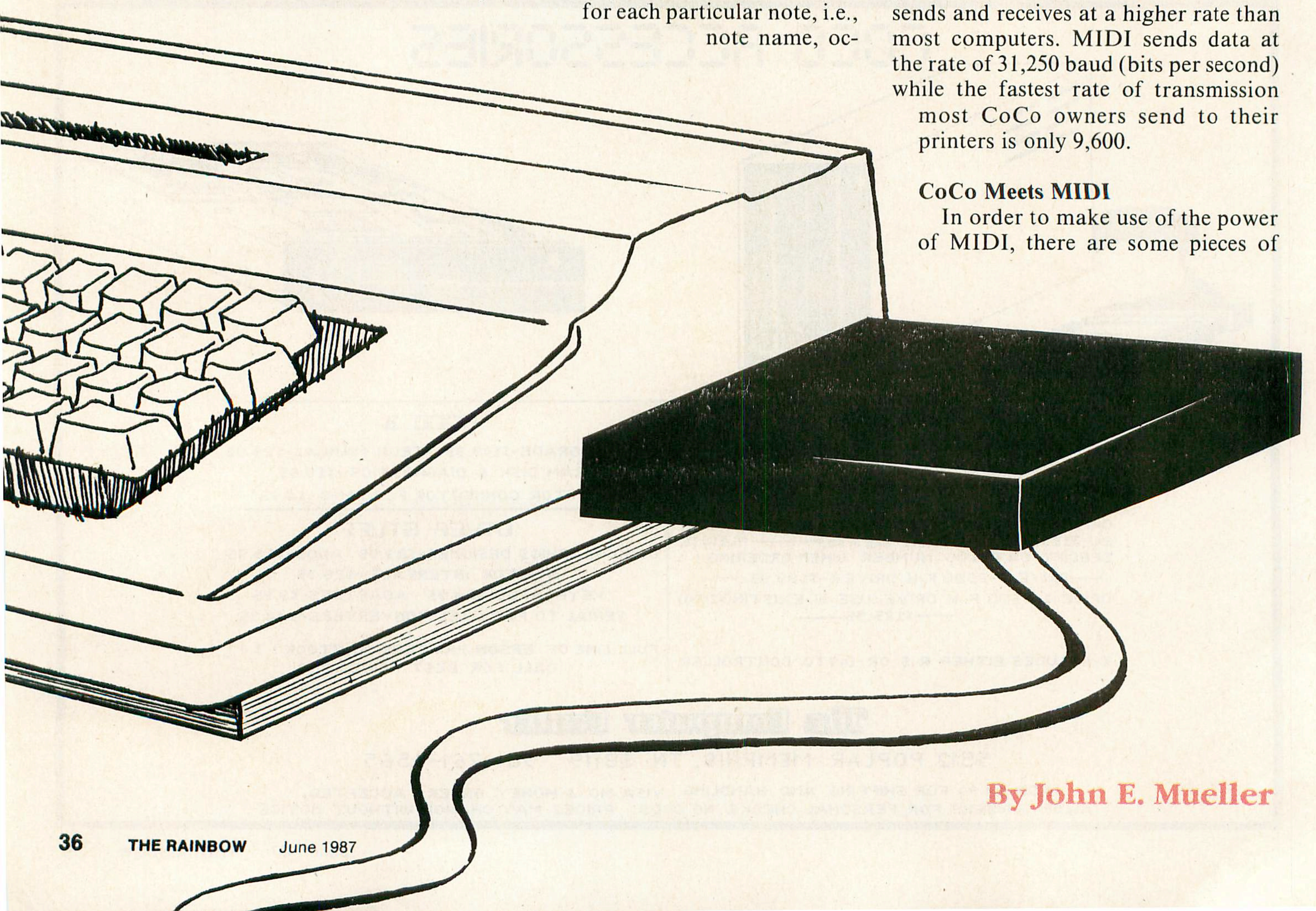
**What Is MIDI?**

MIDI is a system using both hardware and software to enable electronic musical instruments (such as synthesizers) to "talk" to each other and to make it possible for computers to join in on the conversation. This language is in the form of a digital data stream where numbers take the place of musical information. Notes are the most basic type of information that can be sent by MIDI. Each note sent requires several pieces of information (bytes) and they must be sent in order. As in the `PLAY` command of your CoCo, MIDI requires several pieces of information sent for each particular note, i.e., note name, octave, length and volume. MIDI can also transmit information to a synthesizer for what kind of sound to play, such as a trumpet or an organ sound.

Imagine yourself as a composer sitting in one room, and a band is sitting in another room with a telephone linking the two. You speak into the telephone, "Oboe, soft, play C sharp, stop playing. Bass, loud, play D sharp, stop playing," and so forth. MIDI sends information in just this way using binary numbers, or a series of ones and zeros, instead of words, transmitting and receiving at a much higher rate than you or the band could. In fact, MIDI sends and receives at a higher rate than most computers. MIDI sends data at the rate of 31,250 baud (bits per second) while the fastest rate of transmission most CoCo owners send to their printers is only 9,600.

**CoCo Meets MIDI**

In order to make use of the power of MIDI, there are some pieces of



By John E. Mueller

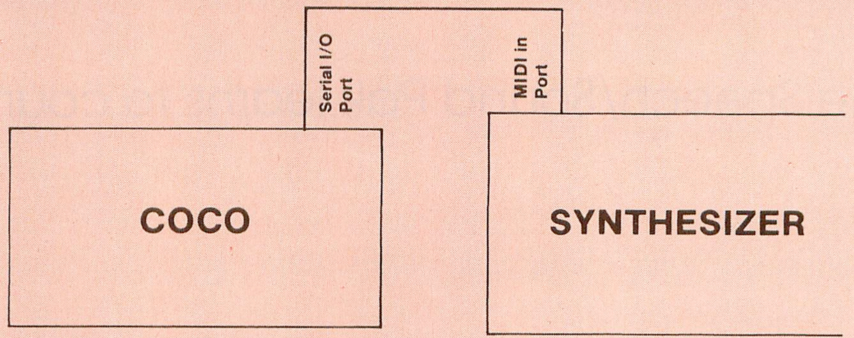


**Figure 1: Sequencer and Sequencer/Editor Setup**

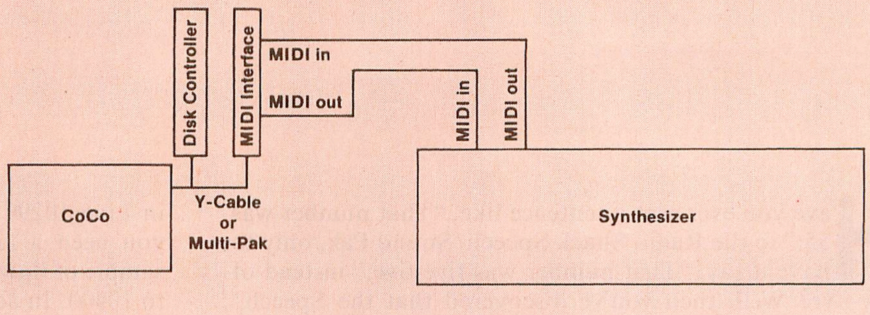


**Figure 2: Sequencer/Recorder Setup**

hardware you must have. The first of these is a CoCo with at least 64K of memory. Most MIDI software also requires that you have at least one disk drive, as well. For some applications you will need a MIDI interface and, finally, you will need a MIDI-equipped musical device such as synthesizer or a drum machine. If you are thinking about buying a synthesizer, be sure and ask if it is MIDI-equipped. There are a lot of electronic keyboards that look like synthesizers. Some have MIDI and some do not.

What you do with this hardware depends on what you want to get out of your music and at what level you want to be involved in its creation.

If you want your CoCo to play music that doesn't sound like it came from a video arcade, then all that you need is software that enables your CoCo to act as a sequencer. A sequencer is a device that tells a synthesizer what notes to play and in what order (sequence) to play them (see Figure 1). When used in this way, it is not necessary for you to have piano keyboard skills to sound great; your CoCo does this work for you. In fact, a CoCo can play things a human player could never do. It can "wiggle its fingers" so fast that the "Minute Waltz" only takes five seconds.

The first MIDI sequencing program for the CoCo was *Musica MIDI*, written by Charles Lanusse and sold by Speech Systems. This program causes a CoCo to read *Musica II* files and output them as MIDI information through its serial I/O printer port. This is a good, low-cost way to get into MIDI and, with the hundreds of *Musica II* files available, you may never want to move any further. The drawbacks of this program are that it only plays four notes at a time; to change or add to the music, you must exit the program and use *Musica II*.

If you have a knowledge of musical notation, but your piano playing isn't very good, you need a sequencer/editor. *LYRA*, written by Lester Hands and also sold by Speech Systems, is a sequencer/editor. With this program you can change (edit) the music without leaving the program, and you can write and play up to eight notes (voices) at one time. This program is very user-friendly. In fact, my high school band students use it to write their music theory assignments.

A more advanced use of the CoCo is as a sequencer/recorder (see Figure 2). Programs of this sort allow your CoCo to act like a tape recorder. What you play on your synthesizer is recorded in the CoCo's memory and then can be played back at any speed and in any key. You could record a song at a slow tempo and then speed it up, or you could play in an easy key and then have the CoCo transpose it (move all of the notes higher or lower) into a new key. It can even do both of these things at the same time. Sequencer/recorders also record on up to 16 different tracks. Using this feature, you could first play in the bass line on Track 1. Then you could add the piano part on Track 2, the brass parts on Track 3, the solo part on Track 4, and so forth. Each new track is added after you get the previous track right. This allows you to work on a piece until you get it just the way you want it.

As you might expect, the price on sequencer/recorders is much higher. You should expect to pay at least $150 for an interface and software. The prices go up from there depending on the interface and the program you choose.

There are four sequencer/recorders on the market at the present time: *Colorchestra*, written by Charles Lanusse and sold by Horizon Software; *CoCoMIDI*, written by Frank Delargy and sold by Speech Systems; *Syntrax* 1.0 and *Syntrax* 2.0, written by Frank Cutolo and Mike Serio, and sold by Intercomp Sound.

This article just scratches the surface of what you and your CoCo can do with MIDI. For more information I suggest the following: *MIDI for Musicians* by Craig Anderton. Amsco Publications, New York (1986). *Synthesizers and Computers* reprinted from *Keyboard* Magazine. GPI Books, Cupertino, CA (1986). *International MIDI Association* 11857 Hartsook St., North Hollywood, CA 91607.

**Sources for CoCo MIDI Products**

Horizon Software Corporation, P.O. Box 289, Opelousas, LA 70570; (318) 942-1938.

Intercomp Sound, 129 Loyalist Avenue, Rochester, NY 14624; (716) 247-8056.

Speech Systems, 38W 255 Deerpath Road, Batavia, IL 60510; (312) 879-6880.

*Questions may be directed to the author at 30665 South Hwy. 211, Colton, OR 97017, 503-824-3148. Please enclose an SASE for a reply.*

SOUND UTILITY

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## The Speech/Sound Pak learns to count

# The Digital Dimension

### By Lindsay Kooser

Have you ever sent a sentence like, "That number was 55," to the Radio Shack Speech/Sound Pak, only to have it say, "That number was five five," instead of fifty-five? Well, then you've discovered that the Speech/Sound Pak can only speak digits.

How would you like a routine that would take care of it for you? How about one that would also be able to take a number in a numerical variable and convert it to text? Look no further! *NumbText* is for you.

*NumbText* is written as a subroutine so it can be added to any BASIC program already containing a text-to-speech routine (like the one in the Speech/Sound Pak manual). All you have to do is send the number you want converted to the routine as the variable `C`, and it will be returned as a text string in `A$`. It sounds simple enough, and it is, but let's look at it a little closer.

At first, the working variables will be cleared in Line 10270; this is where you should `GOSUB` to. Then it will be checked in Line 10290 to see if it is too large for the routine. If so, the message "That number is too large" will be returned. After this, the number will be taken apart and converted one digit at a time until the entire number is contained in up to three string variables (`B#`, `C$`, `D$`). The contents of `B$`, `C$` and `D$` will be combined into `A$`, which will be returned. `A$` can then be sent to the text-to-speech routine or combined with other text and spoken. The numerical variables `C` and `D` are used within the routine and are not preserved, so if you need the number contained in `C` again, you must save it before entering the routine.

I have set up *NumbText* to resolve numbers from 0 to 299. If you don't need numbers that large, change the value in Line 10290 to the largest number you will be using. If you need a larger range of numbers, I have included a sample of how the program can be expanded in lines 10360 to 10400. In addition to the logic line, you will have to add the data line for the next text value you include. For example, if you add the line in my sample, you would `GOSUB 10565`, which would read: `10565 B$="THREE HUNDRED":RETURN`. This adds numbers up to 399. For numbers over 1,000, another string variable would be needed to remain compatible with the program as it stands.

I have intentionally left it short and simple so it can be changed to fit anyone's needs (maybe negative or non-integer numbers could be recognized). If you save *NumbText* in ASCII format, you can merge it into any program you are working on. Have fun.

*(You may direct questions about this program to Mr. Kooser at 800 Windy Lane, Yakima, WA 98903, 509-965-1106. Please enclose an SASE for a reply when writing.)* ☐

---

*Lindsay Kooser lives in Yakima, Washington, and is one of the founders of the CoCo club there. His first contact with computers was the Radio Shack 4K Model 1. He also serves as SysOp for his club's BBS.*

**The listing:** `NUMBTEXT`

```
10000 '**********************
10010 '*      NUMBTEXT      *
10020 '*                    *
10030 '* by Lindsay Kooser  *
10040 '* 800 Windy Ln.      *
10050 '* Yakima, Wa. 98903  *
10060 '* CIS#-71416,637     *
10070 '*     (c)1986        *
10080 '*                    *
10090 '* Number to text sub *
10100 '* routine. For con-  *
10110 '* verting a number   *
10120 '* contained in 'C'   *
```

```
10130 '* to a string value *
10140 '* contained in 'A$'  *
10150 '* so that it can be  *
10160 '* spoken by the R/S  *
10170 '* Speech and Sound   *
10180 '* Pack. The routine  *
10190 '* must be called in  *
10200 '* a gosub to operate *
10210 '* correctly. The     *
10220 '* variables D,A$,B$  *
10230 '* C$ and D$ are used *
10240 '* within the program *
10250 '*********************
10260 'Subroutine entry point
10270 B$="":C$="":D$=" "
10280 'Test for number to large
10290 IFC>299THEN10320
10300 GOSUB10330
10310 A$=B$+" "+C$+" "+D$:RETURN
10320 A$="THAT NUMBER IS TOO LAR
GE  ":RETURN
10330 IFC=0THEND$="0  ":RETURN
10340 IFC<10THENGOTO10520
10350 IFC<20THENGOTO10510
10360 'Additional lines for
10370 'numbers larger than 200
10380 'go here.  I.E.:
10390 ' IFC>299THENC=C-300:GOSUB
-
10400 'to line containing text 3
00
10410 IFC>199THENC=C-200:GOSUB10
570
10420 IFC>99THENC=C-100:GOSUB105
80
10430 IFC=0THENRETURN
10440 IFC<10THENGOTO10520
10450 IFC<20THENGOTO10510
10460 D=INT(C/10):C=C-(D*10)
10470 GOSUB10500
10480 IFC=0THENRETURN
10490 GOTO10520
10500 ON D-1 GOSUB10690,10700,10
710,10720,10730,10740,10750,1076
0:RETURN
10510 ON C-9 GOSUB10590,10600,10
610,10620,10630,10640,10650,1066
0,10670,10680:RETURN
10520 ON C GOSUB10770,10780,1079
0,10800,10810,10820,10830,10840,
10850
10530 RETURN
10540 'Data for text to speech
10550 'Text is mis-spelled for
10560 'more correct pronunciatio
n
10570 B$="TWOHUNDERED":RETURN
10580 B$="ONEHUNDERED":RETURN
10590 C$="TEN":RETURN
10600 C$="EELEVEN":RETURN
10610 C$="TWELLVE":RETURN
10620 C$="THHIRTEEN":RETURN
10630 C$="FORTEEN":RETURN
10640 C$="FFIFTEEN":RETURN
10650 C$="SSSIXTEEN":RETURN
10660 C$="SSSEVENTEEN":RETURN
10670 C$="EIGHTTEEN":RETURN
10680 C$="NINE TEEN":RETURN
10690 C$="TWEN T":RETURN
10700 C$="THHIR T":RETURN
10710 C$="4 T":RETURN
10720 C$="FIFTEE":RETURN
10730 C$="SSSIXTEE":RETURN
10740 C$="SSSEVENTEE":RETURN
10750 C$="EIGHTEE":RETURN
10760 C$="NINE TEE":RETURN
10770 D$="1 ":RETURN
10780 D$="2 ":RETURN
10790 D$="3 ":RETURN
10800 D$="FFOR ":RETURN
10810 D$="FFFIVE ":RETURN
10820 D$="SSSIX ":RETURN
10830 D$="SSSEVEN ":RETURN
10840 D$="8 ":RETURN
10850 D$="9 ":RETURN
```

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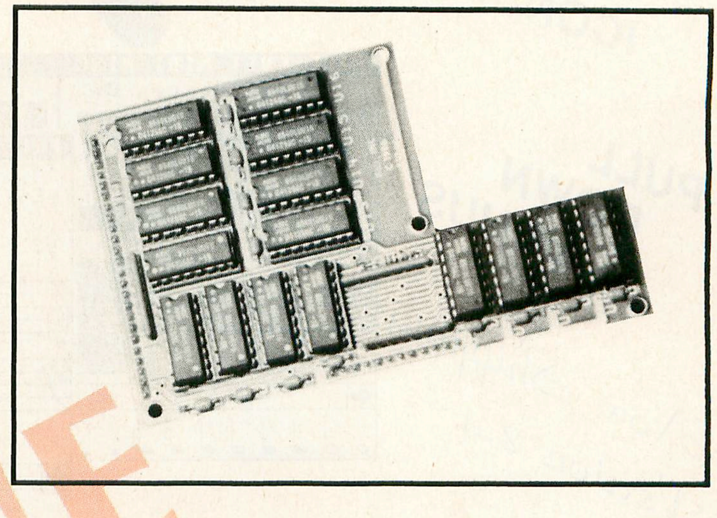

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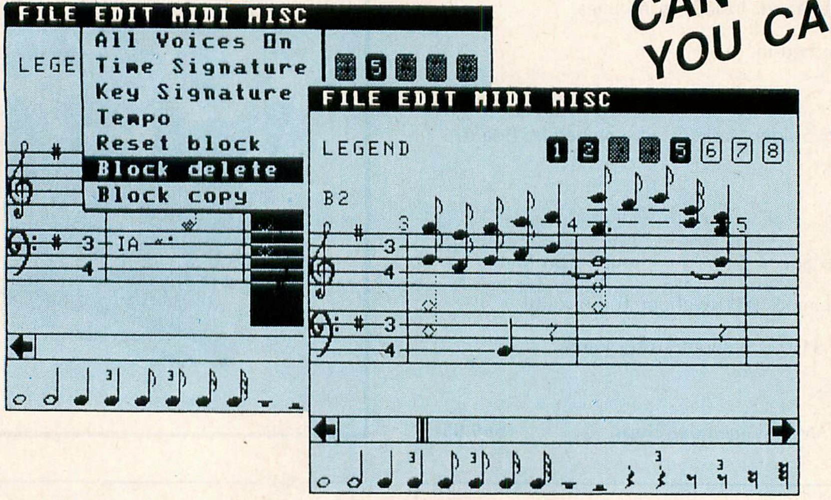

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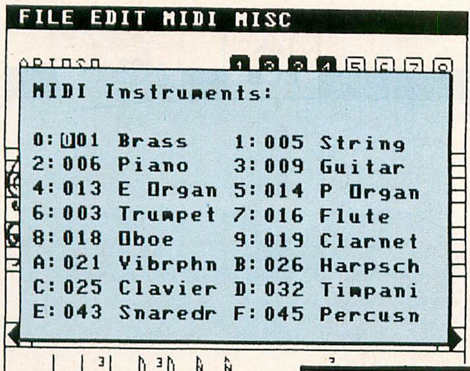

```
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2:006 Piano    3:009 Guitar
4:013 E Organ  5:014 P Organ
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8:018 Oboe     9:019 Clarnet
A:021 Vibrphn  B:026 Harpsch
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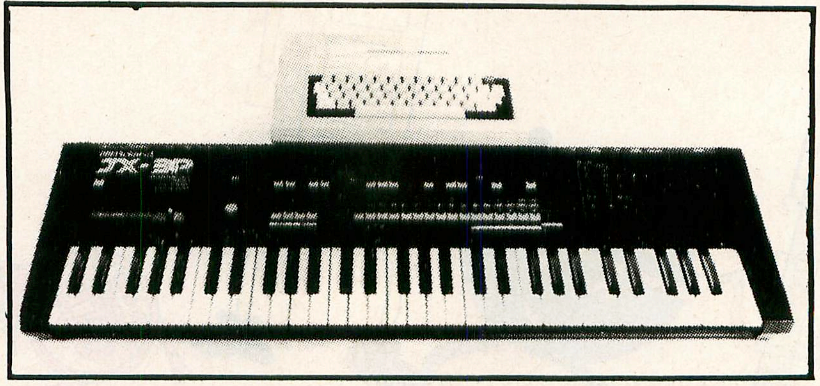

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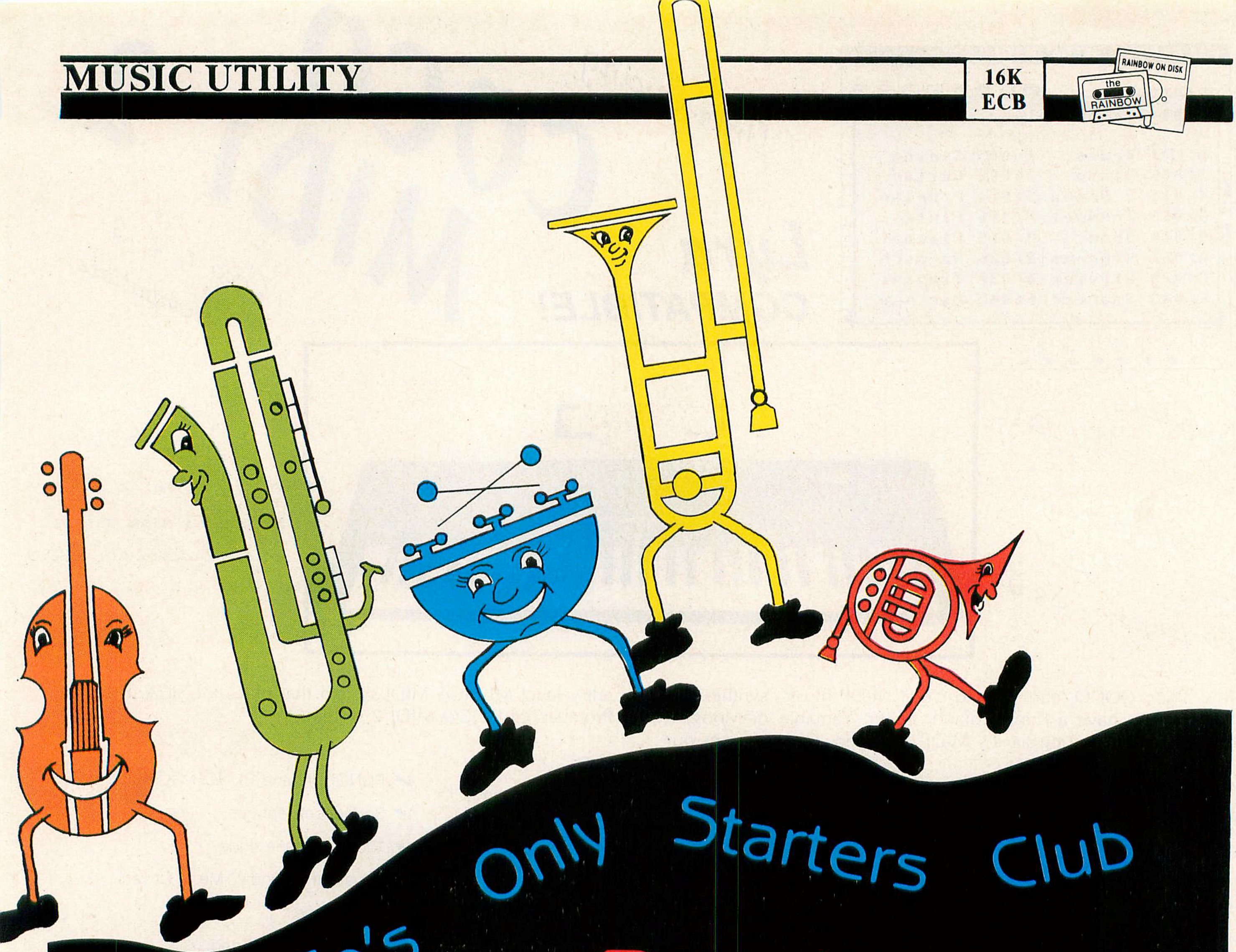

# Sgt. CoCo's Only Starters Club Band

By Bill Bernico

I began playing guitar in the summer of '64 when the Beatles were all the rage. I've kept up with it over the years, and it's all pretty much second nature to me now, but I can remember the difficulty I had when I first tried to play a chord. The books available weren't the most helpful. They simply showed black dots on some lines to represent chords.

Too bad I didn't have my trusty CoCo back then. I could have run this program and saved myself a lot of headaches. So how about if I help you would-be Eddie Van Halens get started? All it takes is a guitar, your CoCo, this program and some patience.

After you run *Strummer*, you'll see what looks like the top section of a guitar neck up to the fifth fret. The strings are labeled on top and you'll see a prompt asking for the speed — slow, medium or fast. The slow option picks out the individual notes of each chord slowly enough for you to see how it's done. The fast option allows you to "strum" a chord with the touch of a single key. The medium option falls somewhere in between strumming and learning.

Once the speed is selected, the prompt changes to let you select which chord you'll play. The choices are natural chords from A to G. For those chords, simply press those keys. The minor chords are represented by the keys 1 to 9. Keys 1 to 7 are the chords A minor through G minor. Key 8 is C# minor and Key 9 is F# minor. I threw those two in simply because you'll use them in a lot of simple songs. Altogether there are 16 chords programmed into *Strummer*.

If you want to change speeds, simply press S when selecting a chord and the speed prompt will reappear.

*(Questions about this program may be directed to the author at 708 Michigan Avenue, Sheboygan, WI 53081. Please enclose an SASE for a reply.)*

---

*Bill Bernico is a self-taught computerist who enjoys golf, music and programming. He is a drummer with a rock band and lives in Sheboygan, Wisconsin.*

```
6 ........137
15 ........76
26 .......109
39...........7
53 .......130
END .....133
```

**The listing:** STRUMMER

```
1 'STRUMMER by Bill Bernico
2 S$=CHR$(202):F$=CHR$(128):Z$=S
TRING$(15,128):Y$=STRING$(6,207)
:W$=CHR$(207):CLS5:FORX=8TO488ST
EP32:PRINT@X,S$;:NEXT:FORX=11TO4
91STEP32:PRINT@X,S$;:NEXT:FORX=1
4TO494STEP32:PRINT@X,S$;:NEXT:FO
RX=17TO497STEP32:PRINT@X,S$;:NEX
T:FORX=20TO500STEP32
3 PRINT@X,S$;:NEXT:FORX=23TO503S
TEP32:PRINT@X,S$;:NEXT:PRINT@9,Z
$;:PRINT@105,Z$;:PRINT@201,Z$;:P
RINT@297,Z$;:PRINT@393,Z$;:PRINT
@489,Z$;:PRINT@8,"e";:PRINT@11,"
a";:PRINT@14,"d";:PRINT@17,"g";:
PRINT@20,"b";:PRINT@23,"e";:PRIN
T@0,"guitar";
4 PRINT@32,"chords";:PRINT@224,S
TRING$(6,207);:PRINT@256,STRING$
(6,207);:PRINT@288,STRING$(6,207
);:PRINT@320,STRING$(6,207);:PRI
NT@224,"select";:POKE1285,32:PRI
NT@256,"speed";:PRINT@288,"S-M-F
";:FORX=1312TO1316:POKEX,PEEK(X)
-64:NEXT:POKE1317,32
5 I$=INKEY$:IFI$="S"THENPLAY"T2"
:GOTO6ELSEIFI$="M"THENPLAY"T8":G
OTO6ELSEIFI$="F"THENPLAY"T60":GO
TO6ELSE5
6 PRINT@224,"select";:PRINT@256,
"chord";:POKE1285,32:PRINT@288,"
A - G";:PRINT@320,"1 - 9";:FORX=
1312TO1316:POKEX,PEEK(X)-64:NEXT
:POKE1317,32:FORX=1344TO1348:POK
EX,PEEK(X)-64:NEXT:POKE1349,32
7 I$=INKEY$:IF I$=""THEN 7
8 PRINT@130,W$+W$+W$;
9 IFI$="S"THEN4
10 IF I$="C"THEN12ELSEIFI$="F"TH
EN13ELSEIFI$="G"THEN14ELSEIFI$="
1"THEN15ELSEIFI$="D"THEN16ELSEIF
I$="E"THEN17ELSEIFI$="A"THEN18EL
SEIFI$="B"THEN19ELSEIFI$="2"THEN
20ELSEIFI$="3"THEN21ELSEIFI$="4"
THEN22ELSEIFI$="5"THEN23ELSEIFI$
="6"THEN24
11 IFI$="7"THEN25ELSEIFI$="8"THE
N26ELSEIFI$="9"THEN27ELSE7
12 PRINT@130,"c";:GOSUB31:GOSUB3
7:GOSUB42:GOSUB46:GOSUB53:GOSUB5
```

*Two-Liner Contest Winner . . .*

If you like a mix of green and medicine, this one's for you.

**The listing:**

```
5 PMODE4:PCLS1:COLOR4:SCREEN1,1:
DRAW"BM50,96U40F20E20D40BM105,96
U40R20D20L20R20D20BM140,96R20U20
L20U20R20BM180,96U40D20R20U20D40
"
10 PLAY"L3GL4FEFEL8FL4EL3.DL4EDE
DL8EL4DL3CL8EL4DCDCL8DL4CL3O2BO3
L8DL4CO2BO3CO2BO3L8CL4DL1EL4GAGL
8AL4GL4AL3GP10L4GAGL8AL4GAL3GP10
L8GEGL8AL4O4CL3DL8CL8O3AL4GL1AL4
GEGAO4CDCO3AGL1.A":GOTO5
```

*Craig Murphy*
*Burlington, IA*

(For this winning two-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

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```
8:GOTO7
13 PRINT@130,"f";:GOSUB29:GOSUB3
7:GOSUB43:GOSUB48:GOSUB53:GOSUB5
9:GOTO7
14 PRINT@130,"g";:GOSUB31:GOSUB3
6:GOSUB40:GOSUB46:GOSUB52:GOSUB6
1:GOTO7
15 PRINT@130,"aM";:GOSUB28:GOSUB
34:GOSUB42:GOSUB48:GOSUB53:GOSUB
58:GOTO7
16 PRINT@130,"d";:GOSUB30:GOSUB3
4:GOSUB40:GOSUB48:GOSUB55:GOSUB6
0:GOTO7
17 PRINT@130,"e";:GOSUB28:GOSUB3
6:GOSUB42:GOSUB47:GOSUB52:GOSUB5
8:GOTO7
18 PRINT@130,"a";:GOSUB28:GOSUB3
4:GOSUB42:GOSUB48:GOSUB54:GOSUB5
8:GOTO7
19 PRINT@130,"b";:GOSUB30:GOSUB3
6:GOSUB44:GOSUB50:GOSUB56:GOSUB6
0:GOTO7
20 PRINT@130,"bM";:GOSUB30:GOSUB
36:GOSUB44:GOSUB50:GOSUB55:GOSUB
60:GOTO7
21 PRINT@130,"cM";:GOSUB31:GOSUB
37:GOSUB45:GOSUB51:GOSUB56:GOSUB
61:GOTO7
22 PRINT@130,"dM";:GOSUB30:GOSUB
34:GOSUB40:GOSUB48:GOSUB55:GOSUB
59:GOTO7
23 PRINT@130,"eM";:GOSUB28:GOSUB
36:GOSUB42:GOSUB46:GOSUB52:GOSUB
58:GOTO7
24 PRINT@130,"fM";:GOSUB29:GOSUB
37:GOSUB43:GOSUB47:GOSUB53:GOSUB
59:GOTO7
25 PRINT@130,"gM";:GOSUB31:GOSUB
39:GOSUB45:GOSUB49:GOSUB55:GOSUB
61:GOTO7
26 PRINT@130,"c#M";:GOSUB32:GOSU
B38:GOSUB42:GOSUB47:GOSUB54:GOSU
B58:GOTO7
27 PRINT@130,"f#M";:GOSUB30:GOSU
B38:GOSUB44:GOSUB48:GOSUB54:GOSU
B60:GOTO7
28 PRINT@8,"E";:PLAY"O2E":PRINT@
8,"e";:RETURN
29 PRINT@72,"F";:PLAY"O2F":PRINT
@72,S$;:RETURN
30 PRINT@168,"F#";:PLAY"O2F#":PR
INT@168,S$+W$;:RETURN
31 PRINT@264,"G";:PLAY"O2G":PRIN
T@264,S$;:RETURN
32 PRINT@360,"G#";:PLAY"O2G#":PR
INT@360,S$+W$;:RETURN
33 PRINT@456,"A";:PLAY"O2A":PRIN
T@456,S$;:RETURN
34 PRINT@11,"A";:PLAY"O2A":PRINT
@11,"a";:RETURN
35 PRINT@75,"A#";:PLAY"O2A#":PRI
NT@75,S$+W$;:RETURN
36 PRINT@171,"B";:PLAY"O2B":PRIN
T@171,S$;:RETURN
37 PRINT@267,"C";:PLAY"O3C":PRIN
T@267,S$;:RETURN
38 PRINT@363,"C#";:PLAY"O3C#":PR
INT@363,S$+W$;:RETURN
39 PRINT@459,"D";:PLAY"O3D":PRIN
T@459,S$;:RETURN
40 PRINT@14,"D";:PLAY"O3D":PRINT
@14,"d";:RETURN
41 PRINT@78,"D#";:PLAY"O3D#":PRI
NT@78,S$+W$;:RETURN
42 PRINT@174,"E";:PLAY"O3E":PRIN
T@174,S$;:RETURN
43 PRINT@270,"F";:PLAY"O3F":PRIN
T@270,S$;:RETURN
44 PRINT@366,"F#";:PLAY"O3F#":PR
INT@366,S$+W$;:RETURN
45 PRINT@462,"G";:PLAY"O3G":PRIN
T@462,S$;:RETURN
46 PRINT@17,"G";:PLAY"O3G":PRINT
@17,"g";:RETURN
47 PRINT@81,"G#";:PLAY"O3G#":PRI
NT@81,S$+W$;:RETURN
48 PRINT@177,"A";:PLAY"O3A":PRIN
T@177,S$;:RETURN
49 PRINT@273,"A#";:PLAY"O3A#":PR
INT@273,S$+W$;:RETURN
50 PRINT@369,"B";:PLAY"O3B":PRIN
T@369,S$;:RETURN
51 PRINT@465,"C";:PLAY"O4C":PRIN
T@465,S$;:RETURN
52 PRINT@20,"B";:PLAY"O3B":PRINT
@20,"b";:RETURN
53 PRINT@84,"C";:PLAY"O4C":PRINT
@84,S$;:RETURN
54 PRINT@180,"C#";:PLAY"O4C#":PR
INT@180,S$+W$;:RETURN
55 PRINT@276,"D";:PLAY"O4D":PRIN
T@276,S$;:RETURN
56 PRINT@372,"D#";:PLAY"O4D#":PR
INT@372,S$+W$;:RETURN
57 PRINT@468,"E";:PLAY"O4E":PRIN
T@468,S$;:RETURN
58 PRINT@23,"E";:PLAY"O4E":PRINT
@23,"e";:RETURN
59 PRINT@87,"F";:PLAY"O4F":PRINT
@87,S$;:RETURN
60 PRINT@183,"F#";:PLAY"O4F#":PR
INT@183,S$+W$;:RETURN
61 PRINT@279,"G";:PLAY"O4G":PRIN
T@279,S$;:RETURN
62 PRINT@375,"G#";:PLAY"O4G#":PR
INT@375,S$+W$;:RETURN
63 PRINT@471,"A";:PLAY"O4A":PRIN
T@471,S$;:RETURN
```

# A Square Deal for Teaching Math

### By Steve Blyn
### Rainbow Contributing Editor

Math facts are often a chore for many students. Frequently, students who have the greatest need to master these facts quickly, are the very students who have the most difficulty learning them. This article presents a method for reviewing math operational facts.

It is wise to use a variety of methods when learning math facts. Different students learn through various means. Flash cards are sufficient for some lucky students, while games are the best solution for others. Any creative approach that can be offered to help all students master the basic math facts should be tried.

Our program presents numbers in a two-by-two square. The child chooses whether to add or multiply the numbers. The numbers are computed by the student first horizontally and then vertically. A final question is given after the four initial answers are calculated.

This final question requires adding or multiplying the two vertical or horizontal answers to obtain a final sum. The answer will be the same whether the two vertical or the two horizontal numbers are used. This aspect of the program somewhat resembles traditional "magic square" problems that students often do for extra credit.

Figure 1 is an example of a typical puzzle from this program. The student is to solve for A, B, C, D and, finally, E. The plus sign at the top left of the puzzle indicates addition was chosen on this round. The answers, of course, are A=11, B=13, C=12, D=12 and E=24. The answer for E is computed by either adding A+B or C+D.

```
+   !        !        !
    !        !        !
--------------------------------
    !        !        !
    !        !        !
    !   4    !   7    !  ?A?
    !        !        !
    !        !        !
--------------------------------
    !        !        !
    !        !        !
    !   8    !   5    !  ?B?
    !        !        !
    !        !        !
--------------------------------
    !        !        !
       ?C?      ?D?     ??E??
```

**Figure 1: Example problem**

Our program is set up for addition and multiplication squares. Lines 60 to 100 permit the student to choose between the two or end the program. Line 130 selects random numbers for each puzzle and lines 190 to 250 make certain that numbers work out correctly.

The puzzle is printed by lines 540 to 610 and lines 140 to 170. The remainder of the program asks for the answers. A congratulatory message is printed if a correct answer is given. A "sorry" message accompanies incorrect answers, which are then replaced by the correct answer.

Many simple modifications are possible for this program. As it stands now, it covers addition and multiplication examples. You can easily change the random numbers to make the program more difficult, and a change to subtraction or division would not be much trouble. If you try this, however, make certain Line 200 or Line 240 checks out each example. When doing subtraction, check for a positive answer. When doing division, check for a whole number quotient.

---

*Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.*

Any four of the math operations can also be used for checking decimal *number math*. Again, change the random numbers to fit your needs. Signed number examples are yet another type of math that can be used in this format. If you are experimenting with any of these modifications, please avoid any disasters by saving a copy of the original.

As an added challenge or follow-up activity to this program, students may be encouraged to do traditional true magic squares. These are 3-by-3 squares whose resulting sum is the same whether the math is done horizontally, vertically or diagonally. Several of the puzzle's numbers are left out for the student to compute.

Figure 2 shows an example of a magic square. The solution to this magic square is A=3, B=2 and C=18. Any horizontal row or any vertical column (and even the two diagonal rows) will equal 18. A nice challenge for our readers would be to create a magic squares computer program. As always, we here at Computer Island enjoy receiving letters and comments from our readers. Keep them coming! ☐

```
+
- ! ------- ! ------- ! -------- ! --

    !  A  !  10  !  5  !
- ! -----------------------------------

    !  8  !  6  !  4  !
- ! -----------------------------------

    !  7  !  B  !  9  !

                                --------

                                !  C  !
                                --------
```

**Figure 2: Magic Square**

**The listing:** `MATHPLAY`

```
10 REM"SUPER SQUARES"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1987
30 CLS
40 PRINT@24,"super";
50 PRINT@55,"squares";
60 PRINT@449,"CHOOSE aDD OR mULT
IPLY OR eND";
70 EN$=INKEY$
80 IF EN$="A" THEN J$="+":PRINT@
34,"+";:GOTO 120
90 IF EN$="M" THEN J$="*":PRINT@
34,"X";:GOTO 120
100 IF EN$="E" THEN CLS:END
110 GOTO 70
120 PRINT@448," "
130 A=RND(9):B=RND(9):C=RND(9):D
=RND(9)
140 PRINT@134,A;
150 PRINT@140,B;
160 PRINT@230,C;
170 PRINT@236,D;
180 IF J$="+" THEN 230
190 E=A*B:F=C*D:G=A*C:H=B*D:I=A*
D
200 IF E*F<>G*H THEN 130
210 I=E*F:J=G*H
220 GOTO 260
230 E=A+B:F=C+D:G=A+C:H=B+D:I=A+
D
240 IF E+F<>G+H THEN 130
250 I=E+F:J=G+H
260 GOSUB 550
270 PRINT@145,"";
280 INPUT W
290 IF W=E THEN PRINT@145,"CORRE
CT";:GOSUB 620:PRINT@145,E
300 IF W<>E THEN PRINT@145,"SORR
Y";:GOSUB 630:PRINT@145,E
310 PRINT@241,"";
320 INPUT X
330 IF X=F THEN PRINT@241,"GOOD"
;:GOSUB 620:PRINT@241,F
340 IF X<>F THEN PRINT@241,"SORR
Y";:GOSUB 630:PRINT@241,F
350 PRINT@324,"";
360 INPUT Y
370 IF Y=G THEN PRINT@324,"GREAT
";:GOSUB 620:PRINT@320," ":PRINT
@325,G;:GOSUB 550
380 IF Y<>G THEN PRINT@324,"SORR
Y";:GOSUB 630:PRINT@320," ":PRIN
T@325,G:GOSUB 550
390 PRINT@330,"";
400 INPUT Z
410 IF Z=H THEN PRINT@331,"YAY";
:GOSUB 620:PRINT@330," ":PRINT@3
31,H;:GOSUB 550
420 IF Z<>H THEN PRINT@329,"SORR
Y";:GOSUB 620:PRINT@329," ":PRIN
T@331,H;:GOSUB 550
430 PRINT@369,"";
440 INPUT R
450 IF R=I THEN PRINT@370,"SUPER
";:GOSUB 620:PRINT@369,I
460 IF R<>I THEN PRINT@370,"SORR
Y";:GOSUB 630:PRINT@369,I
470 FOR T=1334 TO 1430 STEP 32:P
OKE T,128:SOUND 250,1:NEXT T
480 FOR T=1462 TO 1456 STEP-1:PO
KE T,128:SOUND 250,1:NEXT T
490 PRINT@484,"PRESS enter TO GO
 AGAIN";
500 EN$=INKEY$
510 IF EN$="E" THEN CLS:END
520 IF EN$=CHR$(13) THEN RUN ELS
E 500
530 GOTO 530
540 REM"DRAW THE LINES"
550 FOR T=1090 TO 1104:POKE T,12
8:NEXT T
560 FOR T=1220 TO 1232:POKE T,13
1:NEXT T
570 FOR T=1316 TO 1333:POKE T,12
8:NEXT T
580 FOR T=1060 TO 1316 STEP 32:P
OKE T,128:NEXT T
590 FOR T=1130 TO 1322 STEP 32:P
OKE T,128:NEXT T
600 FOR T=1136 TO 1424 STEP 32:P
OKE T,128:NEXT T
610 RETURN
620 PLAY"L200CEGCEGFFFEEEDDDCCC"
:RETURN
630 PLAY"L30FFGG":RETURN
```

MUSIC UTILITY

32K Disk

# Pick and Choose From the Music Menu

### By Mark S. Camp

The *Music+* program by Bob Ludlum (June 1984 and June 1986 issues) is a terrific program for making music with your CoCo. Using *Music+* to create the music, I have developed an entire collection of Christian hymns (60 as of this writing). I quickly tired of trying to remember the filename for each hymn and having to `LOADM` and `EXEC` each one. So, I wrote a small program to give me a menu to select from, which made things a bit easier. Yet, I felt that after all the time programming the music, why not also display the words to the verses as the hymns played.

I developed *Menu* to select one hymn from a menu of eight hymns or to play all the hymns on the menu. You can not only select and play songs created with *Music+*, but also print the words to verses as the songs play.

Lines 20 to 100 allow room to write a screen for your menu, as well as load in a song to play while the title screen is being displayed. I have my program load a binary picture file. To load a picture (an extension of `.BIN` is assumed), first remove the `REM` from lines 50 and 60. Then, substitute the filename of your binary picture in place of `TITLPIC` in Line 50. To load in a title song, simply remove the `REM` in Line 100 and substitute the filename of the song you want to play in place of `TITLSONG`.

Lines 170 to 240 contain the titles of eight songs that will be displayed on the menu. Remember, substitute a regular title for the string `TITLE`. For example, if the first song on the menu is "Amazing Grace," Line 170 would read:

```
170 A$="AMAZING GRACE"
```

Line 370 loads in the song that corresponds to Selection 1 on the menu. If my binary `MUSIC+` file for "Amazing Grace" was called `AMAZING`, I would change the `XXXXX` in Line 370 so the line would read:

```
370 LOADM"AMAZING"
```

Substitute song filenames in place of `XXXXX` in lines 370, 510, 640, 770, 900, 1030, 1160 and 1290.

Now, let's type in words to verses. These lines are the beginning of new selections: 320, 460, 590, 720, 850, 980, 1110 and 1240. Following these lines you will see some lines that contain the statements:

```
REM words to verse 1 (or to verse 2)
REM words
```

Delete these `REM` statements and substitute lines with `PRINT` statements containing the words to one verse. For most hymns you will be able to get all the words to a verse and chorus in two or three program lines. Songs with long verses may not fit onto one screen. This is a limitation of this program. Using a Hi-Res screen would give more room for words; however, some Hi-Res screens I tried messed up the repeat execution of the songs.

Let's look at the program process for one song selection. After the title screen is displayed and the title song is played, the selection menu appears. You can play either one song or all the songs. You are asked before each song whether or not you want all the verses.

Suppose you select the first song on the menu. Notice the routine beginning at Line 330. The title to the song is printed and you are asked if you want all verses. No matter whether you choose Y or N, the words to Verse One are displayed and the song is loaded and executed. The `GOSUB` routine in Line 1380 stops the disk drive after the song is loaded and executes the song; otherwise, the drive would spin while the song is playing. Remember — the `EXEC` in Line 1380 takes care of song execution for Verse One on all menu selections.

If you answered Y to the question "Do you want all verses?" the program plays Verse One then goes to Line 400, displays the words to the next verse and executes the song again, which is still in memory. Notice that if you only have one verse to a song, you should delete any other lines in that particular song section up to the line that reads:

```
IF A=0 THEN. . .
```

You should only have as many sets of `PRINT` and `EXEC` statements as you do verses. Lines marked: `REM WORDS` can be used to print additional verses. You may

---

*Mark Camp lives in Ballwin, Missouri, and is an archives specialist with the National Personnel Records Center in St. Louis. He is also an ordained minister in the Southern Baptist Convention.*

need to add a line or two. You will also need to add some EXEC statements if you intend to execute the song more than two times.

If you answered N to the verse question, the program jumps to Line 440 to see if you selected to play all of the songs on the menu. If not, you are returned to the selection menu. If you did select to play all the songs, the program jumps to the next song section and the routine continues.

In summary, this is a very simple program and there are only a few tips to keep in mind:

- When you make a music file with *Music+*, make it so that it only plays through one verse. The EXEC statements will make it repeat as necessary.
- You should only have as many PRINT and EXEC statements within each section as you do verses. If you only have words to two verses and do not delete any extra EXEC statements within each song section of the program, the song will continue to EXEC.
- When making a song with *Music+*, I find it helpful to place a quarter rest either at the beginning or end of the song. This will give a short break between the EXEC statements.
- Be sure to substitute song filenames for XXXXX in the LOADM "XXXXX" statements; otherwise, you will get an NE Error.
- The regular screen format of the CoCo is adequate for printing the words to most hymns. If you have a chorus that is repeated after each verse, save yourself some typing. Type the chorus in the bottom of the song section and make a GOSUB routine after each verse of words and before the EXEC statement.

In closing, let me suggest a use for CoCo music. In the past I have pastored small churches where often there was no organist or pianist. This meant singing without instruments. On one occasion, I made recorded tapes by playing the hymns from my CoCo through the stereo. Then, on Sunday, I took the tape along with a portable stereo to church. You guessed it — CoCo at the piano! With the numerous recent developments in music programs and stereo packs for the CoCo, you might find church music can take on dimensions never dreamed of before, especially in small churches. My thanks to Bob Ludlum for a super program in *Music+*.

*(You may address questions about this program to the author at 221 Highview Drive, Ballwin, MO 63011. Please enclose an SASE for a reply.)* ☐

**Editor's Note: RAINBOW ON TAPE and RAINBOW ON DISK will include a *Music+* file, called HYMN, which can be used with *Musxmenu*.**

| | |
|---|---|
| 270 | 141 |
| 460 | 202 |
| 710 | 58 |
| 950 | 216 |
| 1130 | 235 |
| END | 142 |

**The listing:** MUSXMENU

```
10 CLS
20 REM lines 20-70 are for
30 REM title screen such as
40 REM words or binary picture
50 REM LOADM "TITLPIC"
60 REM PMODE4,1:SCREEN1,1
70 REM
80 REM line 100 can be used
90 REM load a title song
100 REM LOADM"TITLSONG":GOSUB150
0
110 CLS
120 CLS:PRINTTAB(6)"SONG SELECTI
ON MENU"
130 PRINTTAB(1)STRING$(30,"%")
140 PRINT" WHICH WOULD YOU LIKE
TO HEAR?"
150 PRINT
160 REM ***TITLE LINES 170-240**
*
170 A$="TITLE"
180 B$="TITLE"
190 C$="TITLE"
200 D$="TITLE"
210 E$="TITLE"
220 F$="TITLE"
230 G$="TITLE"
240 H$="TITLE"
250 I$="end program"
260 J$="play all of above songs"
270 PRINT"1-"A$:PRINT"2-"B$:PRIN
T"3-"C$:PRINT"4-"D$:PRINT"5-"E$:
PRINT"6-"F$:PRINT"7-"G$:PRINT"8-
"H$:PRINT"9-"I$:PRINT"0-"J$
280 PRINT:INPUT" # OF SONG...";A
290 CLS:IF A=0 THEN PRINT"YOU WI
LL BE ASKED AT THE":PRINT"BEGINN
ING OF EACH SONG WHETHER":PRINT"
OR NOT YOU WANT ALL VERSES.":FOR
ZZ=1TO2800:NEXTZZ
300 IF A=0 THEN 330
310 ON A GOTO 330,470,600,730,86
0,990,1120,1250,1360
320 REM ***SONG 1 SECTION***
330 CLS:PRINTA$:PRINT:GOSUB1370
340 CLS:PRINT"(1)"
350 REM words to verse 1
360 REM words
370 LOADM"XXXXX"
380 GOSUB1380
390 IF V$="Y" THEN 400 ELSE GOTO
 440
400 CLS:PRINT"(2)"
410 REM words to verse 2"
420 REM words
430 EXEC
```

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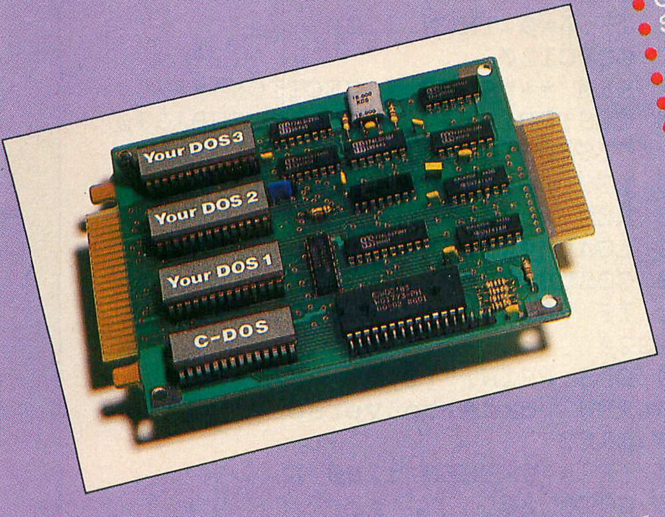

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```
440 IF A=0 THEN 470
450 GOTO120
460 REM ***SONG 2 SECTION***
470 CLS:PRINTB$:PRINT:GOSUB1370
480 CLS:PRINT"(1)"
490 REM words to verse 1
500 REM words
510 LOADM"XXXXX"
520 GOSUB1380
530 IF V$="Y" THEN 540 ELSE GOTO
 570
540 CLS:PRINT"(2)"
550 REM words to verse 2
560 EXEC
570 IF A=0 THEN 600
580 GOTO120
590 REM ***SONG 3 SECTION***
600 CLS:PRINTC$:PRINT:GOSUB1370
610 CLS:PRINT"(1)"
620 REM words to verse 1
630 REM words
640 LOADM"XXXXX"
650 GOSUB1380
660 IF V$="Y" THEN 670 ELSE GOTO
 700
670 CLS:PRINT"(2)"
680 REM words to verse 2
690 EXEC
700 IF A=0 THEN 730
710 GOTO120
720 REM ***SONG 4 SECTION***
730 CLS:PRINTD$:PRINT:GOSUB1370
740 CLS:PRINT"(1)"
750 REM words to verse 1
760 REM words
770 LOADM"XXXXX"
780 GOSUB1380
790 IF V$="Y" THEN 800 ELSE GOTO
 830
800 CLS:PRINT"(2)"
810 REM words to verse 2
820 EXEC
830 IF A=0 THEN 860
840 GOTO120
850 REM ***SONG 5 SECTION***
860 CLS:PRINTE$:PRINT:GOSUB1370
870 CLS:PRINT"(1)"
880 REM words to verse 1
890 REM words
900 LOADM"XXXXX"
910 GOSUB1380
920 IF V$="Y" THEN 930 ELSE GOTO
 960
930 CLS:PRINT"(2)"
940 REM words to verse 2
950 EXEC
960 IF A=0 THEN 990
970 GOTO120
980 REM ***SONG 6 SECTION***
990 CLS:PRINTF$:PRINT:GOSUB1370
1000 CLS:PRINT"(1)"
1010 REM words to verse 1
1020 REM words
1030 LOADM"XXXXX"
1040 GOSUB1380
1050 IF V$="Y" THEN 1060 ELSE GO
TO 1090
1060 CLS:PRINT"(2)"
1070 REM words to verse 2
1080 EXEC
1090 IF A=0 THEN 1120
1100 GOTO120
1110 REM ***SONG 7 SECTION***
1120 CLS:PRINTG$:PRINT:GOSUB1370
1130 CLS:PRINT"(1)"
1140 REM words to verse 1
1150 REM words
1160 LOADM"XXXXX"
1170 GOSUB1380
1180 IF V$="Y" THEN 1190 ELSE GO
TO 1220
1190 CLS:PRINT"(2)"
1200 REM words to verse 2
1210 EXEC
1220 IF A=0 THEN 1250
1230 GOTO120
1240 REM ***SONG 8 SECTION***
1250 CLS:PRINTH$:PRINT:GOSUB1370
1260 CLS:PRINT"(1)"
1270 REM words to verse 1
1280 REM words
1290 LOADM"XXXXX"
1300 GOSUB1380
1310 IF V$="Y" THEN 1320 ELSE GO
TO 1350
1320 CLS:PRINT"(2)"
1330 REM words to verse 2
1340 EXEC
1350 GOTO120
1360 POKE113,3:EXEC40999
1370 PRINT:INPUT"DO YOU WANT ALL
 VERSES (Y/N)";V$:RETURN
1380 POKE&HFF40,0:EXEC:RETURN
```

*Hint . . .*

## Set the Tone for Input

In order to make your programs more user-friendly, precede all `INPUT` and `INKEY$` statements with a tone. This is a simple way of letting the user know that the computer is asking for input. A good statement to use for generating the tone is `SOUND100,5`. While this "hint" is really just common sense, the little extra trouble will be much appreciated by other users.

*John Dillon*
*Fullerton, CA*

## COCO CONSULTATIONS

# A Matter of Drives

### By Marty Goodman
### Rainbow Contributing Editor

*Are 1.2-Meg, quad-density drives the same as 720K drives? Can I use them on the CoCo? Can I use an Atari, 3½-inch 720K drive on a CoCo?*

*Mike Knudsen*
*(RAGTIMER)*
*Wheaton, IL*

The 1.2-Meg, 5¼-inch drives used on the IBM PC AT are not compatible with Color Computer disk controllers. These drives use an electronic protocol for data transmission different from that used by 160K, 320K and 720K capacity drives. They are not the same as the double-sided, 80-track drives used by other systems. The PC AT type, 1.2-Meg drives use a signal protocol identical to that used by the older 8-inch drive technology at the time 8-inch drives became obsolete. Their data transfer rate is twice that of other 5¼-inch drives, and data density is twice as great, too.

The Atari 520 and 1040 ST machines use industry standard, 3½-inch drives that, in theory, can be directly hooked to a Color Computer disk controller with the correct connectors and cable. Although Atari uses an odd connector on its main computer box for the drives, inside the drive sports a normal 34-pin, dual-row header 3½-inch drive connector. Connectors that crimp to ribbon cable and mate to that connector on the 3½-inch drive are available everywhere, including Radio Shack (Catalog No. 276-1525). However, such Atari drives tend to be terminated in an odd way. So pay close attention to what kind and size of terminator resistors are used on the Atari drive you are planning to adapt for the CoCo.

### Hi-Res Joystick Interface

*Can you tell me how to use the Radio Shack Hi-Res joystick interface?*

*Brian Biggs*
*(BIGGSER)*
*Grove City, OH*

OS-9 Level II has drivers that support the Hi-Res joystick interface built into it. This allows OS-9 programmers to easily design software supporting the Hi-Res joystick adapter. Steve Bjork, in his series of articles about the Mouse software published in RAINBOW last year, presents source code for using the Hi-Res joystick interface. Unfortunately, the interface is of little use with existing software written for Disk Extended BASIC. Assembly language programmers should study that code carefully if they plan to write code for the interface. In particular, they should note how Steve synchronizes the start of the ramp generator with the horizontal sweep to reduce jitter in the position check caused by interference between the monitor and the interface.

### Drive Stepping Rates

*How do I change the stepping rates of disk drives under OS-9 Level II?*

*Bill Jackson*
*(BILLJACKSON)*
*Sacramento, CA*

In the Utilities database in the Delphi OS-9 Online SIG is a small program called *Dmode*. After downloading it, be sure to set the E attribute with `attr`, then set your step rate by typing `dmode /d0 STP=3`, then `COBBLER`ing a new system disk. Thanks to Greg Law (GREGL, one of our OS-9 SysOps) for this information.

I suggest reading the OS-9 manual for information about how such parameters as step rates are stored in the device descriptor. Changing the step rate is just a matter of altering a single byte in a parameter table in the appropriate

---

*Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW's CoCo and OS-9 Online SIGs on Delphi. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.*

device descriptor. This can be accomplished using the *Dmode* utility, or any of a number other approaches.

### How Many Drives

*I'd like some clarification about the number of floppy drives I can hook to a Color Computer. Some say I can hook three, others four, and some allege they can hook 16 or more.*

*Paul Ward*
*(PKW)*
*Arlington, VA*

There are limitations to the number of drives you can hook to a CoCo disk controller. If you are using single-sided drives, the maximum supported is four. If you're using double-sided drives, the controllers can support a maximum of three floppy drives. The reason for this is that the CoCo controller lacks an official side-select line and, instead, was designed to use Pin 32 (normally the side-select line) of its floppy controller to select for the fourth drive in the system. Thus, when double-sided drives are used, there is no select line for the fourth drive, because that is now being made to serve (by appropriate driver software) as a side-select line. Only three drive select lines remain, and thus only three double-sided floppies can be used.

In practice, three really are all you are likely to need. Three double-sided, 80-track drives give over two megabytes of storage. If you need more, use a hard drive system.

Of course, hardware hackers, by combining software and hardware modifications, can address any number of drives. Indeed, using only a chip or two, you can easily support 16 drives. To me it seems a waste of effort that would be more sensibly directed at setting up a hard drive system.

### 64 Color Display

*I've seen demonstrator programs that display all 64 of the CoCo 3's colors on the screen at once. Will we see games and other applications that can do this too?*

*Eric Crichlow*
*(DIAWA)*
*Las Vegas, NV*

No. The programs that display all 64 colors use very specialized and "sneaky" tricks to accomplish this, which involves altering the color palette during the scan of the video picture. This sort of thing eats up an enormous amount of processor time and is of little use in programs that do more than display a single, static picture. On the CoCo 3, it also results in some "noise" on the screen, due to "settling" of the data in the palette registers of the GIME chip. On the other hand, it is true that the trick of switching color sets has in the past been employed on the CoCo. The *Dragonfire* ROM pack uses that trick to achieve eight colors on the screen at once in a CoCo 2 mode that normally only supports four colors.

### Do-It-Yourself Upgrade

*What do you think of piggybacking four sets of four 41256 chips and mounting them on an 18-pin header as a means of achieving a "do-it-yourself" CoCo 3 512K upgrade? Are C65 and C66 in the CoCo 3 merely RFI suppression capacitors, and is that why they are often removed in the course of doing CoCo 3 memory upgrades? What about C10, C11 and C61? Are they RFI suppressors, and is there any advantage to*

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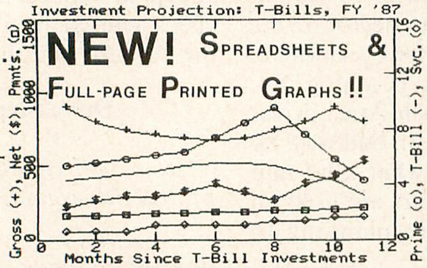

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*yanking them? Will the new 1 bit-by-1 megabyte or the new 4 bit-by-256K chips that are just now being released be of use in future CoCo 3 upgrades?*

*Vincent S. Estep*
*Cameron, MO*

While it should be possible to make a working upgrade using the piggyback method you suggest, I do not recommend it, primarily because in its current form, the 512K CoCo 3's DRAMs generate a lot of heat, and your suggested piggyback arrangement is rather poor for heat dissipation. If you want to try such an ill-advised approach, be sure to add to each DRAM chip a .33 mfd deglitching capacitor diagonally across its power supply pins. Failure to do so will result in an especially unreliable upgrade.

C65 and C66 are most definitely *not* RFI suppression caps. Instead, they appear to be "RAS/CAS timing fudge factor" caps that, in conjunction with R22 and R23, alter the timing of the RAS and CAS lines to the DRAM chips to apparently fix some flaw in the GIME chip. This timing fudge factor apparently does not work with the 512K upgrade, and that is why you are instructed to remove one or both of C65 and C66, or to alter the value of one of the resistors in that circuit there. C10, C11, and C61 do appear to be RFI suppressors on the E clock, Q clock and CTS line, respectively. I tend to agree with your suggestion that removing them will improve the reliability of the CoCo 3's operation, as I would expect them to "mushify" the E and Q clock timing signals and the CTS select line. But I have not tested this theory.

Regarding the newer, one megabit DRAM chips: I have been watching the prices on these items with interest. While the 1 bit wide-by-1 megabit chips will be of no interest to CoCo 3 owners, the 4 bit wide-by-256K chips might form the basis of a very sensible upgrade for the CoCo 3 when the price comes down enough. The last time I checked, retail prices for the 1 bit-by-1 megabit chips were around $25, and the 4 bit wide-by-256K chips were around $40. When the price on the 4 bit-by-256K chips drops to $10 or less, they will present attractive alternatives for CoCo 3 upgrades. They will have the advantage of lower power consumption and better timing when used in the CoCo 3.

Note that the 4 bit-by-256K chips have 20 pins, not 18 like the 4 bit-by-64K chips that come with a 128K CoCo 3. The pin out is such that they are not amenable to being placed in the existing 18-pin socket used by the 4 bit-by-64K chips. Either a redesign of the CoCo 3 motherboard or a different plug in upgrade board will be required. It's possible that a year or two from now the CoCo 3 could be sold as a 512K only computer, with such 4-by-256K chips used on the motherboard if Tandy elects to redesign the board to support this.

### CoCo 3 Hard Drives

*I'm looking for a hard drive for my CoCo 3. I've seen some ads for a 20-Meg hard drive and IBM controller in* Computer Shopper *priced at about $350 to $450. Can I use these?*

*Erol Senakis*
*(EROL)*
*Elmhurst, NY*

The "controller" card used by the IBM PC is, strictly speaking, *not* a controller card, but rather a combination of a controller card and an IBM-specific "host adapter." Thus, IBM "hard drive controller cards" generally are useless with the Color Computer. Instead, you need to use a CoCo host adapter made by Tandy, or L&R Tech (sold by Owlware), or by CRC (Disto) that, in turn, plugs into one or another brand of stand-alone hard drive controller board, such as the Xebec 1401A controller. This stand-alone controller board in turn can connect to any of a number of hard drive units. You might find it to your advantage to buy the hard drive unit without a controller via *Computer Shopper*, and perhaps, after deciding on a particular hard drive host adapter, shop for the needed stand-alone board via mail order. But IBM controller cards tend to be specific for the IBM system bus and, as such, are worthless for the Color Computer.

**Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.**

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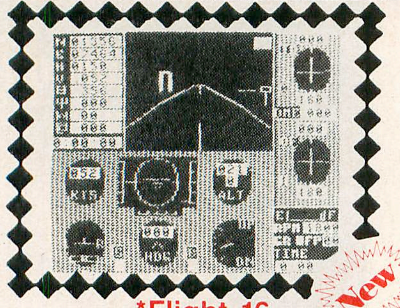

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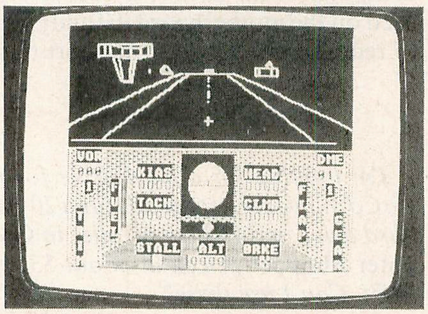

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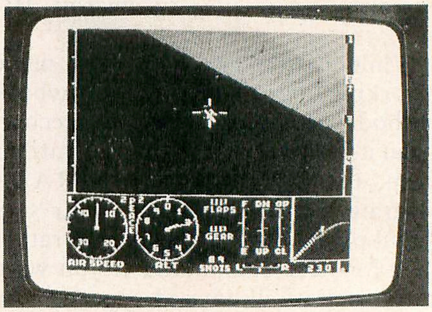

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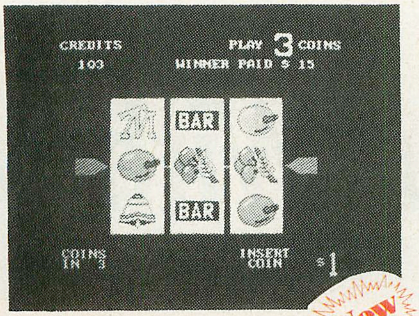

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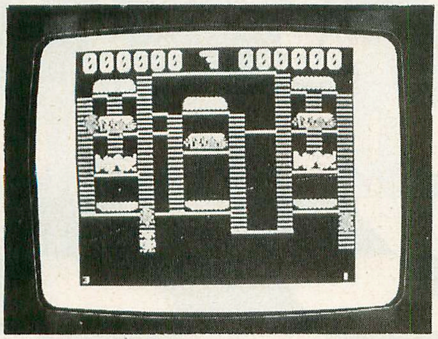

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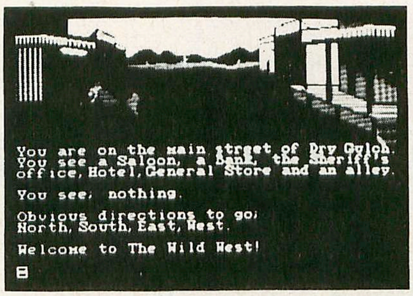

```
You are on the main street of Dry Gulch.
You see a Saloon, a Bank, the Sheriff's
office, Hotel, General Store and an alley.

You see, nothing.

Obvious directions to go;
North, South, East, West.

Welcome to The Wild West!
```

## *The Wild West

**— Color III Only —**

Get out your six shooter and polish your spurs! Journey into the gunslinging land of the old west. As sheriff of Dry Gulch, your job is to keep the peace. But the notorious desperado Black Bart has escaped from jail and is on his way to Dry Gulch to recover his hidden fortune!

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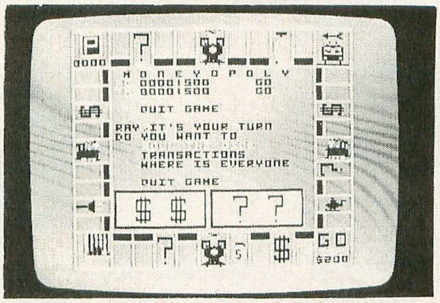

```
M O N E Y O P O L Y
 00001500         GO
 00001500         GO

   QUIT GAME

RAY, IT'S YOUR TURN
DO YOU WANT TO

   TRANSACTIONS
   WHERE IS EVERYONE

   QUIT GAME
```

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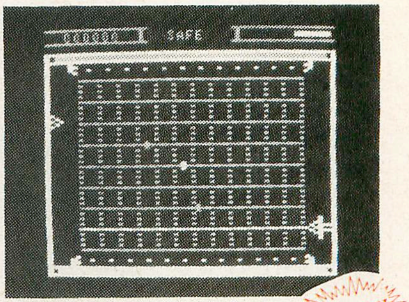

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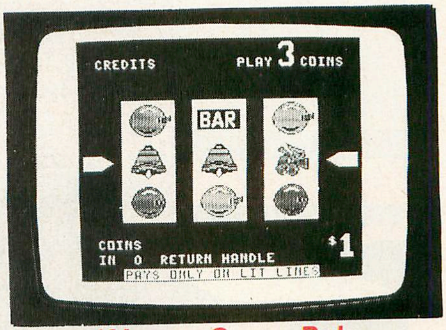

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| ***DONUT DILEMMA** | — Angry Angelo has raided Antonio's Donut Factory and you must restore law and order. But hurry! Time is running out! | Requires 32K<br>$24.95 |
| ***CHAMBERS** | — Exciting high res graphics game with multiple screens and outstanding sound. Destroy the evil creatures in 20 levels, 30–35 rooms per level. | 32K & Joysticks Required<br>$22.95 |
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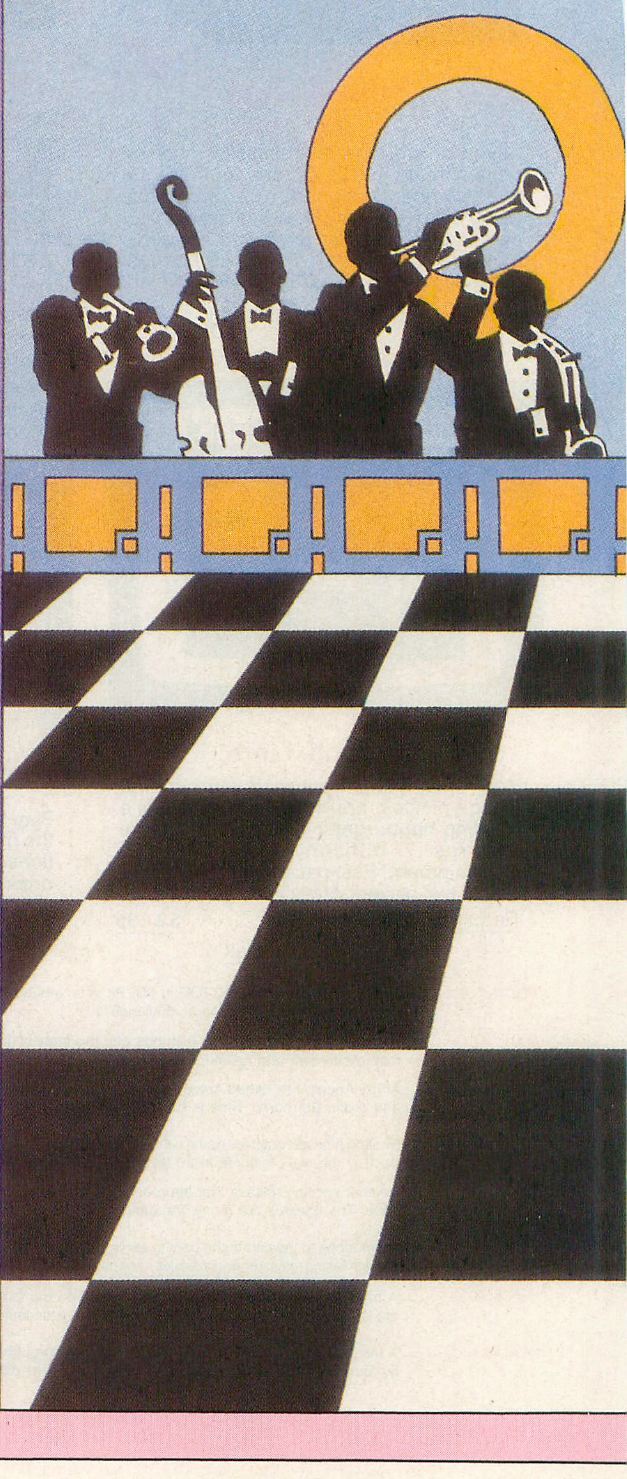
# Steppin' Out With My

### By Matthew Thompson



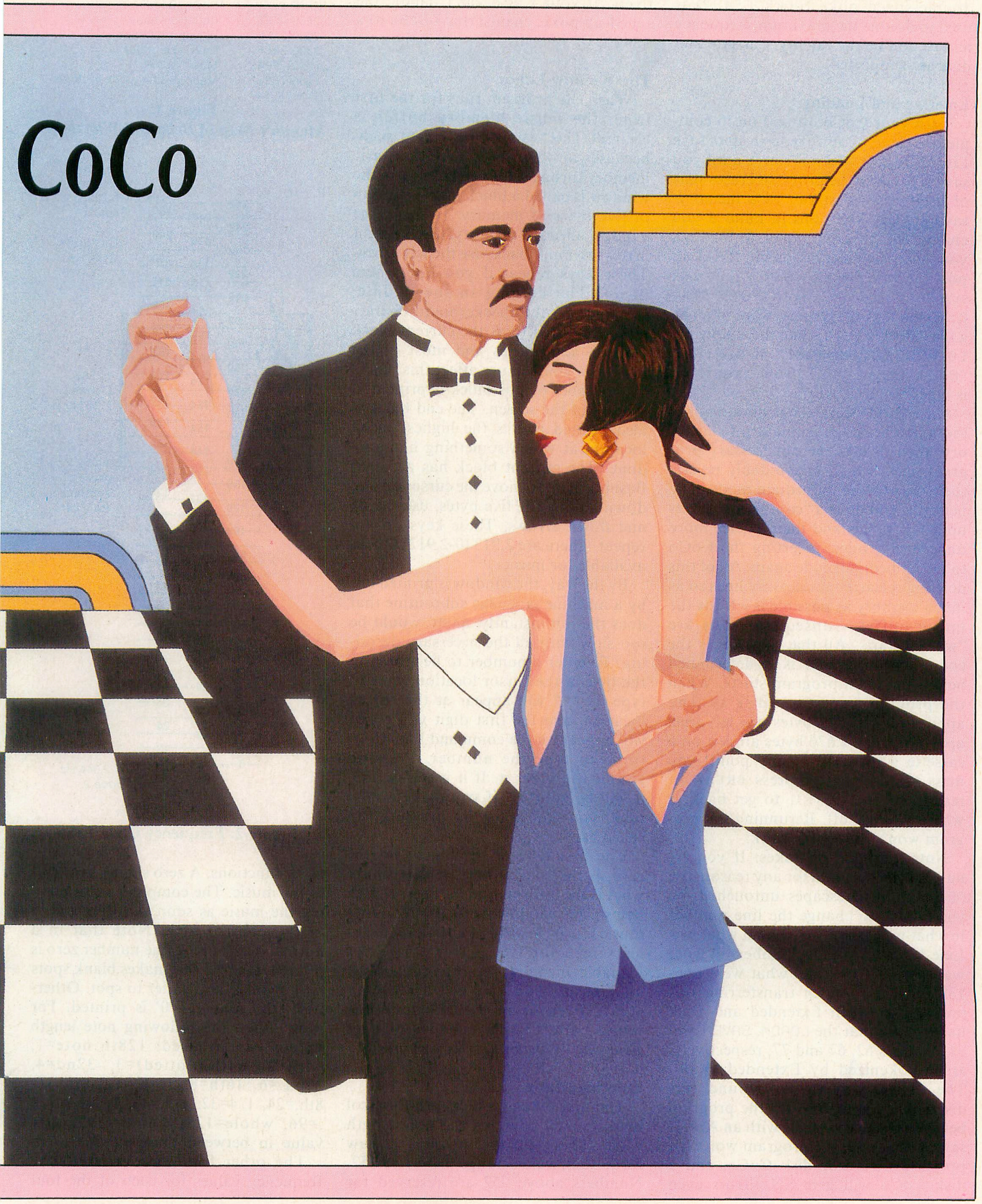
*Bells and Whistles 2* is a four-voice, programmable music synthesizer for the CoCo. It requires 32K and Extended or Disk BASIC. There are many four-voice music programs on the market for the CoCo, all having their strengths and weaknesses. But when it comes to the final product, the music, *Bells and Whistles 2* is one of the best sounding, all-software music programs for the CoCo that I have heard.

It is compatible with *CoCo Composer* and *Music+* files. There are eight waveform and eight envelope tables that can be custom-designed. Any of the four voices can switch between any of the tables as the music plays. Each voice's volume, as well as the tempo and key of the music, can be automatically changed as the music plays. Percussion (noise) is available, and there is enough memory for five to 30 minutes of music. Jumps, repeats, breakpoints, labels and placeholders can be set to aid in music writing. It has a 10.583 octave "window" available anywhere from a 15.083 octave range

---

*Matthew Thompson, a 16-year-old senior attending Napanee District Secondary School, lives in Napanee, Ontario. He enjoys composing music and hardware hacking on his CoCo 3, and he has designed a 4MHz 6809 board for it.*

# CoCo



of 0.1 to 3107 Hz. There is a 128-band, graphic equalizer function for customizing the frequency response. The true double-speed poke (`POKE 65497`) is used to double the maximum frequency and to double the fidelity. Cassette and disk are supported.

**Entering and Loading**

Turn your CoCo off and on to completely clear it out. Type in and save Listing 1, `BW2`. Do not run it until you save it because the program erases part of itself when first run as a memory-saving trick. Keep this in mind if you change the program. Prior to loading, you have to clear as much RAM as possible with `POKE25,6:NEW`. For disk systems, use `POKE25,14:POKE3584,0:NEW`. A disk owner may want to make a file called `BW2INIT` like the following: `10 POKE25,14:POKE3584,0:RUN "BW2"`. This way, all you'll have to do is type `RUN"BW2INIT"`.

On a "cold" start, the program pokes the machine language data into memory, then deletes the unnecessary program lines, which unavoidably reverts the CoCo to the immediate mode. The next run you do is a "cool" start. It sets up a few tables and then deletes more unnecessary lines, reverting the CoCo to the immediate mode again. All of this deleting releases unnecessary lines so as much memory as possible is left for the music buffer. Subsequent runs are "warm" starts. All that happens is the end-of-music pointer is re-determined before the main program starts. When the program runs on a disk system, approximately *628* bytes are left free; approximately 2,676 bytes are left on a cassette system. If, at any point, you mess up the screen, press BREAK or reset, and enter `GOTO1` to get back to where you left off. Rerunning the program won't erase your work.

Note a couple of flukes: If you renumber the program for any reason, the `DEL` command escapes untouched, so you'll have to change the line number in what was Line 136 to equal what was Line 135, and the line numbers in what was Line 134 to equal what were lines 133-134. Also, when transferring this program between Extended and Disk BASIC, note that the `LOADM`, `SAVEM` and `DIR` in lines 62, 67 and 77, respectively, aren't tokenized by Extended BASIC. The easiest way to get around this discrepancy is to transfer the program between the two systems with an ASCII save. Otherwise, the program won't list properly on a non-disk CoCo, and a disk CoCo *will* give SN Errors even though the lines look OK. If you own a CoCo 3, change the `65495` and `65494` in Line 73 to `65497` and `65496`, respectively. If your CoCo can't handle the speed-up poke, change that `65495` to a `65494`.

**The Window Editor**

When the program runs for the first time, the music memory buffer is cleared. The "window" is called such, because you view a section of the music memory through it. Each column in the window is called a block and is a group of five bytes of memory. To move the window ahead in memory, use the right arrow. To move back, use the left arrow. These keys repeat if you hold them down. The column in the middle, straddled by the checkerboard characters, is referred to as the current block because any entries and most of the functions you will use affect this block. The number of this block is printed at the top of the screen. The end block is also printed and is the highest block location at which something has been done. The current block has a cursor flashing in it. To move the cursor up and down among the five bytes, use the up and down arrows. These keys do not repeat. There are 2,913 (0-2,912) blocks available for music.

By the way, the window is printed out by a machine language subroutine that does the job instantly. BASIC would be too slow with all the necessary decoding. To enter a number to be stored in the byte at the cursor location, start to type it. ??? will appear at the cursor location, and the first digit you typed will appear on the command line. Continue to type the number. Pressing ENTER will enter it. If it is above 255, it will be aborted. If you make a mistake, you can abort by pressing the space bar.

The first byte of the block, in row zero, is the control byte. It determines what is the information in the next four bytes. This window method of entering music is used instead of a Hi-Res graphics screen for two reasons. It saves valuable memory for other functions and music. And you will have more control over the individual bytes of the music buffer. For a memory map of *Bells and Whistles 2*, refer to Figure 1.

| Hex Address | Function |
|---|---|
| 600-2DFF | BASIC program cassette |
| E00-2DFF | BASIC program disk |
| 2E00-2EFF | Pitch table |
| 2F00-2FFF | Equalizer table |
| 3000-37FF | Waveform tables |
| 3800-3FFF | Envelope tables |
| 4000-78E4 | Music buffer |
| 7906-7FE5 | Machine Language routines |

**Figure 1: Memory Map of *Bells and Whistles 2***

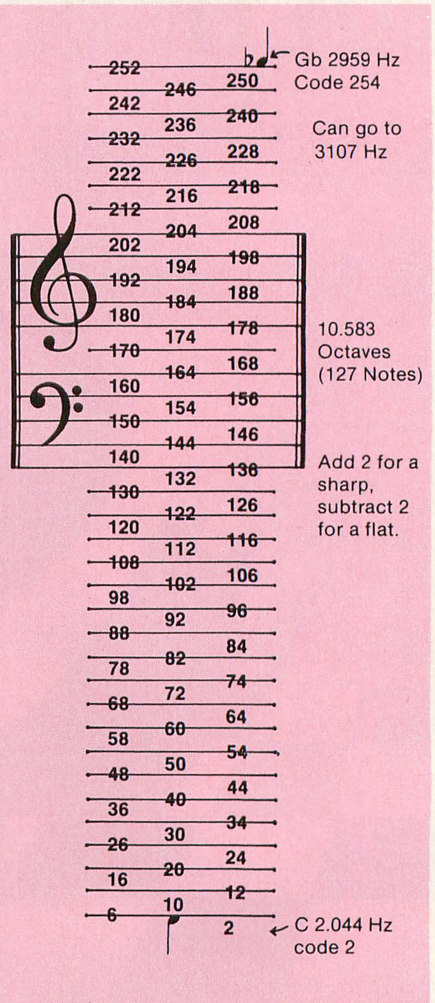


**Figure 2: Frequency Code Table**

**Entering Music**

The first byte of a block, the control byte, usually contains the note length value. These are the numbers in row zero. Their values range from 1 to 252. Numbers above 252 are reserved for other functions. A zero signifies the end of the music. The computer stops playing the music as soon as it hits a zero in the control byte. Note that in a normal music block, the number zero is printed as a ".". This makes blank spots look blanker and easier to spot. Otherwise, the numeral '0' is printed. For most tunes, the following note length values can be used: 128th note=1, 64th=2, 64th.(dotted)=3, 32nd=4, 32nd.=6, 16th=8, 16th.=12, 8th=16, 8th.=24, 1/4=32, 1/4.=48, 1/2=64, 1/2 .=96, whole=128, whole.=192. Any value in between these can be used.

The other four bytes contain the frequency values for each of the four

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voices. These values can be found in the table in Figure 2. To make a note sharp, *add two* to the value before entering. To make it flat, subtract two from the note. A rest is set by entering a zero. As a time-saver, the CLEAR key puts a zero into the byte at the current cursor location.

Because *Bells and Whistles 2* has envelopes for the voices, you need to interpolate the notes you enter. When you type in the pitch value for a note, press the @ key instead of ENTER. The note you typed will be entered with a hyphen preceding it. It is actually the value you entered plus one, which tells the computer to "link" this note to the previous one. When the computer plays the note, the envelope will continue where it left off from the previous one in that voice. Otherwise, the envelope is reset to the start. To interpolate a section of music, you first break down the note length values so that the pitch in at least one voice changes in each block. Study the example in Figure 3 to clarify this point. If you want to link a note that isn't, or unlink one that is, you don't have to retype it. Move the cursor over it and press the hyphen key. This toggles the link on and off.

**Functions**

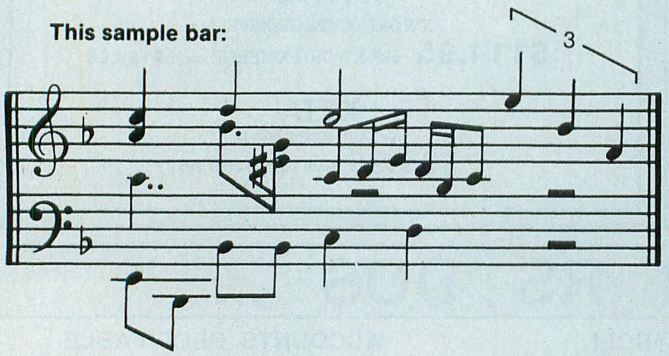
There are many useful functions in *Bells and Whistles 2*, and each one is summoned with a keystroke. Some of the more "dangerous" ones are in uppercase letters and require you to use the SHIFT in conjunction with them. A list of the function keys is given in Figure 4. You can escape to the main program from some of them should you accidentally press the wrong key. Just enter an out-of-range value (e.g., over 2,912 for a block number, a key not shown in the function's menu, etc.). However, many of them take place immediately and most have a certain degree of idiot-proofing that chops off fractions and eliminates negatives.

The Fast Play function transfers control to the machine-language music-generating routine. The CoCo's clock speed is set to 1.789 MHz by `POKE 65497`. This poke puts the entire CoCo address space into high speed. `POKE 65495` only speeds up the computer every time it accesses memory locations above 32767 (BASIC and cartridge ROM). This speeds up BASIC programs by about 50 percent, but it makes hardly any difference with RAM-based programs below 32768. The `POKE 65497` does not put the CoCo into triple speed, as many CoCo nuts have thought. The speed-up has the effect of doubling the sampling rate of the music program.

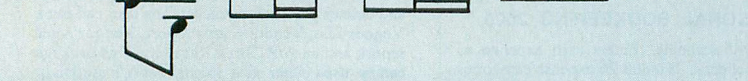
| | |
|---|---|
| b) | Breakpoint Block (BRK) |
| c) | Cancel display |
| C) | Copy |
| d) | Display |
| D) | Delete |
| e) | End Repeat Block (ERT) |
| f) | Find Label |
| F) | Frequency Transposition |
| i) | Insert |
| j) | Window Jump |
| J) | Music Jump Block (JMP) |
| k) | Klaxxon |
| l) | Label Block (LAB) |
| L) | Load |
| M) | Memory Clear |
| n) | Note Transposition |
| N) | NOP Block (NOP) |
| o) | Odd Files |
| p) | Slow Play |
| P) | Fast Play |
| Q) | Quit |
| s) | Start Repeat Block (SRT) |
| S) | Save |
| t) | Tempo Block (TMP) |
| v) | Volume Block (VOL) |
| w) | E/W Create |
| W) | E/W Block (E/W) |
| y) | Sync Block (SYN) |
| z) | Zing Here |
| Z) | Zing End |
| -) | Link Toggle |
| =) | Equalizer |
| \) | Directory-generated with SHIFT-CLEAR |
| CLEAR) | Clear |

Figure 4: Function Key Assignments

**This sample bar:**



**Should be thought of as:**



**And coded as:**

```
WINDOW                                                    ≐ 64/3(32+32)
                                                          ↙    ↓    ↘
0:   16   16   16    8    8   16    8    8    8    8   16   21   22   21
1:  194 - 194  198 - 198 - 198  194 - 194 - 194 - 194 - 194 - 194  202  190  180
2:  188 - 188  190 - 190  184  170  174  180  174  166  170   .'    .    .
3:  170 - 170 - 170 - 170  180    .    .    .    .    .    .    .    .    .
4:  130  120  142  142 - 142  146 - 146 - 146  150 - 150 - 150    .    .    .
```

Figure 3: Interpolation Example

The machine language routine takes 288 clock cycles to calculate and output a byte to the CoCo's internal audio digital-to-analog converter. Considering it has to take into account the waveform, envelope, and volume of each voice, as well as the tempo and note length, the machine code is very efficient. At 1.789 MHz, the computer can output 1,789,000/288=6,214 bytes per second to the DAC. This limits the maximum frequency producible to 6,214/2=3,107 Hz, as at least two samples have to be taken from the top and bottom of any waveform to make a sound.

# Telewriter-64™
## the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

### THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

### TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

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Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

### 64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

### RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

### FEATURES & SPECIFICATIONS:

**Printing and formatting:** Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW
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**File and I/O Features:** ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette autoretry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

**Editing features:** Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

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For those of you whose computers can't handle the speed pokes, a Slow Play function has been included. However, the sampling rate is only 3,107 Hz for a maximum sound frequency of 3,107/2=1,554 Hz. The frequency values shown in Figure 2 are cut in half as well. You will have to cut the tempo in half and raise the pitch an octave. More on that later.

When the music plays, you will hear a slight background swishing sound. This is quantatization noise and is unavoidable with digitally generated sound at audible sampling rates. When the music is played, the printer will spill out trash unless you turn it off or put it offline due to fact that the RS-232 output bit shares the same byte with the DAC.

The Insert function pushes all blocks, beginning at the current one, ahead by one block. This leaves an empty current block so you can squeeze something in between other blocks. The Delete function does the opposite by moving all blocks ahead of the current one back by one, erasing the current block. Both of these functions are done by machine language subroutines so they happen very fast.

Before you actually enter and play any music, it is vital that you understand the next four functions, because they must be defined at least at the beginning of a piece of music.

The waveform of a sound is basically a graphic representation of how it sounds. *Bells and Whistles 2* allows you to create any waveform imaginable. To make a new one, enter the Envelope/Waveform Create function, then select the Waveform option at the prompt. A menu now appears with a choice of waveforms. After you have pressed your choice, you will be asked to supply the table number you want the waveform to be created in. Eight tables are available (0-7) allowing a great deal of flexibility in your musical creations.

Under the Waveform options, the Square option produces a square wave. It has a fairly harsh sound but is good for a lot of tunes. The Sawtooth option makes a sawtooth wave, which is also harsh sounding. The Triangle wave option produces a sound similar to a flute. The Sine Harmonic option allows a little more flexibility. You enter the relative intensities of the fundamental and harmonic multiples of a sound, similar to stops on an organ. The computer will then mix (co)sine waves of the specified intensities at the various harmonic pitches into one waveform that will have all of the harmonics you entered (even if you don't think it looks as though it really does). It takes a while for the computer to do all the necessary trig calculations.

By setting the first harmonic at 1 and the rest at 0, you can get a sine wave, which has a pure sound. Note that many waveforms generated by this algorithm have less-than-maximum amplitude. The program automatically scales them up after it is finished, however.

The Graphics option allows you to graphically design a waveform in set/reset graphics. You will see a blank black screen with a little white dot in the bottom-left corner. The up/down arrows control the amplitude of the cursor dot. When you are satisfied with its position, press the right arrow to move to the next position. In effect, you are drawing the waveform. Note that the Lo-Res graphics screen can show 64 horizontal by 32 vertical pixels. The waveform tables have 256 bytes ranging in values from 0 to 255. Therefore, each vertical pixel from the bottom of the screen is worth eight in the actual table, and each horizontal pixel actually sets four bytes in the table. The waveform you draw should represent just one complete cycle, as the computer loops around from the right-hand side of the waveform back to the left when played. Unfortunately, if you make a goof, you will have to redo the waveform.

The Byte by Byte option allows you to individually enter the value for each byte. This can be too tedious to be practical. But it is there if you want it.

Finally, the Noise/Percussion option fills a waveform table with random values. When played, it sounds like noise. When used with pitch values below 100, you can fake a drum sound. This can accompany music in the other voices. After you are finished with any of the waveform options, the wave just made will be displayed. Press any key to return to the window. The Just Checking option puts you there right away, allowing you to review the contents of a table you forgot about, etc.

The envelope of a sound is basically a graphic representation of its volume over time. Choose envelopes at the first prompt of the Envelope/Waveform Create function. A menu similar to the waveform options will appear. The Graphics option is the same as in the waveform department. Note that each byte in the envelope table corresponds to one note length unit. Therefore, each horizontal pixel of the graphics option represents four note length units. The Flat option sets a plain, flat envelope for a simple on/off sound, like an organ.

The most commonly used option is Exponential Decay, which causes a fading sound like a piano or a bell. The decay value determines the speed at which the decay drops off. It ranges from about 1.005 for slow decays to about 1.5 for sharp boink sounds, such as snare drums when combined with the noise waveform. The Absolute sub-option makes the decay as is, while the Relative sub-option takes any envelope already in the table and "modulates" it with a decay. Under the Absolute sub-option, you will be asked for a strum factor. This is the note length value you want the decay to be reset to each time it counts that number. For instance, 256 makes a simple decay, while at around 4, banjo effects occur, as every four note length units a "strum" will occur. The input range is 1 to 256. By using the Relative sub-option on a previously created strumming envelope, you can get a decaying strum.

The Byte by Byte option is not very practical for making entire envelopes. Its main purpose is to allow you to have accurate control over the attack, or rise, of the envelope by setting the first one, two, three or more bytes to whatever you want. Then, to avoid entering the rest of the bytes, enter a 256, which makes the computer think you goofed and sends you back to the window. Neat effects can be produced with this function. As with waveforms, you get to see the envelope one last time before you are returned to the window. The Just Checking option works the same.

Set/Reset graphics are used in the Graphic and Just Checking options, as well as the display-before-return routine because all the RAM was cleared with the `POKE25, X` earlier and no Hi-Res graphics can be used. However, if you have a CoCo 3, the ultra-Hi-Res graphics use memory beyond BASIC. While the vertical axis still would have to be scaled to one pixel per value increase of two, the horizontal axis can easily show each byte of the 256-byte table and then some. This means that each horizontal pixel in ultra-Hi-Res corresponds to one byte or one note length value, while each vertical pixel represents an amplitude value of two. So if you want to upgrade the graphics for your CoCo 3, type in the lines in Listing 2, `BW2C3FIX`, over the ones in the original version. These lines do not include the speed poke changes mentioned, or any other changes mentioned in this article.

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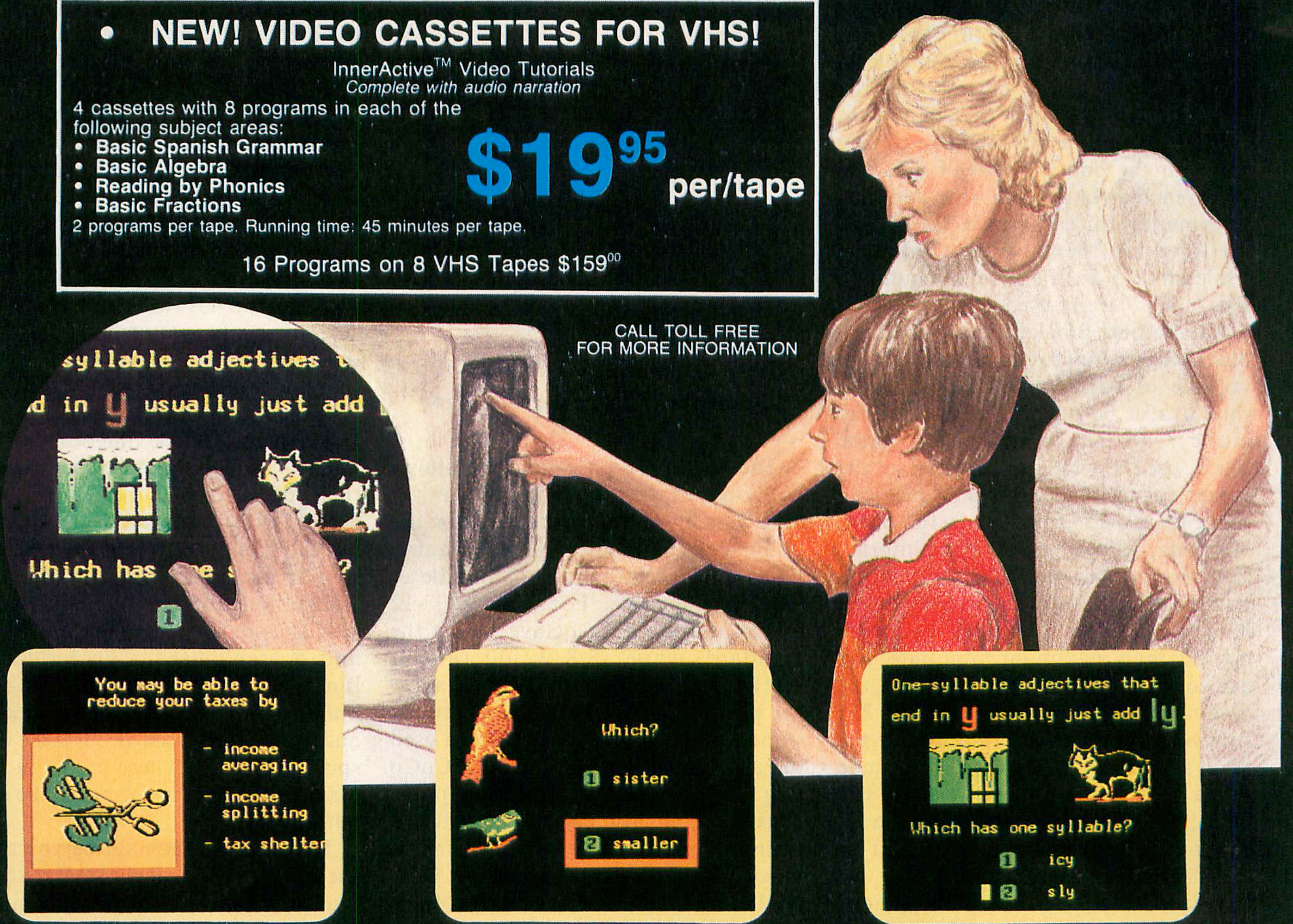

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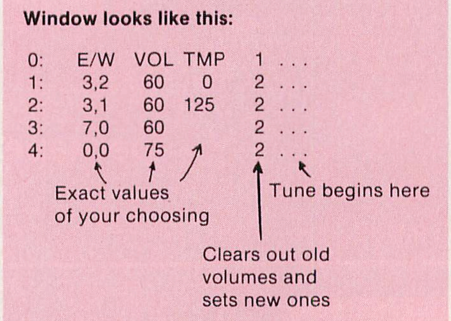
Now that you know how to create waveforms and envelopes, you have to let each voice in *Bells and Whistles 2* know which combination of tables it will use. The Envelope/Waveform Block function turns the current block into one that does just that. At each prompt, enter the envelope and waveform number combination you want to use with each voice. These blocks can be placed anywhere in the tune to switch combinations in mid-music, but at least one should be at the start so that the computer knows what to begin with. You can also create this block by putting a 255 in the control byte of a block. Then each byte in each row contains information for each voice. Bits 0-2 of the byte are the waveform number, while bits 3-5 are the envelope number. Bits 6 and 7 aren't used.

The Volume Block function creates a block that allows you to adjust the volume of each voice. One of these should also be put at the start of the music. Once you've created a volume block, use the window cursor to set the values for each voice. The values can range from 0-255 for silent to full blast. However, values below 10 are impractical, except 0 for total silence. The total volume of the four voices usually ought not to exceed 255. If a voice's waveform has less-than-maximum amplitude, you can squeeze out extra volume with the volume function by exceeding the 255 sum limit, or at least cranking up the voice's volume. If you notice a rude cracking sound somewhere in the music, it is due to the volume being set too loud in the offending voice(s). This is called foldover distortion.

Volume blocks can also be placed anywhere in the music to change it in mid-stream. Although the volume of a voice may have been changed, the old volume stays in effect until a note is played in that voice. This means that "leftover" values from previous notes, if a voice is playing a rest after a volume change, can occasionally cause foldover distortion. If that happens, put a block with a note length of 1 and (possibly linked) pitch values of 2 in each voice right after a volume change. The format of a volume block consists of a 254 in the control byte and the value of each voice's volume in the other four bytes.

The Tempo Block function changes the tempo of the music. One of these should also be at least at the beginning of a tune. The tempo value can range from 1 to 65,535, though values generally range from 30 to 200. Note that the tempo is printed as two separate bytes. The tempo equals the first byte times 256 plus the second byte. However, the tempo rarely exceeds 255, so the bottom number is all that usually counts. The tempo block consists of a 253 in the control byte followed by a 32 tempo flag code, then the most and least significant bytes of the tempo. Byte 5 is not used. Figure 5 is an example of how a typical tune should begin.



**Window looks like this:**

```
0:   E/W   VOL TMP   1 ...
1:   3,2   60    0   2 ...
2:   3,1   60  125   2 ...
3:   7,0   60        2 ...
4:   0,0   75        2 ...
```

**Figure 5:
Example of Beginning of a Tune**

The Key Transpose function allows you to adjust the pitch of the synthesizer as a whole. At the prompt, enter the number of semitones' offset you want to have from the standard of middle A equaling 440 Hz. For instance, -12 lowers the pitch an octave below the standard, while +3.8 would raise it $3^4/_5$ths semitones (decimal values allow for positioning the frequency between standard values). This can also be used to raise the pitch of a tune on a CoCo that can't handle the speed-up poke. There is one problem: If the pitch is raised to a point where a note in the music would normally exceed the 3,107 Hz limit of *Bells and Whistles 2* (1,554 Hz for regular speed CoCos), it is topped out at 3,107 (1,554) Hz. The offset range for this function is +/- 256 semitones.

A similar function, Note Transpose, changes the actual values for the pitches in the music buffer for one or all voices. You specify which voice(s) you want to change, the start and end blocks of the section you want to change and the actual offset value. For instance, +24 raises the values by an octave, while -2 lowers them by a semitone. Odd-numbered values are unnecessary and are rounded to the next-lowest, even absolute value. If the value when added to a byte exceeds 255 or would go below 2, or if a byte is a rest, the byte is left unchanged. Also, if the byte is part of a control block, it is ignored.

*Bells and Whistles 2* has a 128-band graphic equalizer built in. Normally, the frequency response is set to flat, and indeed, you may never use this function at all. But should you have to, choose the Custom option under the Equalizer function. Then enter the relative intensities for all 128 bands at each prompt with values from 0 to 255. Unless you want total silence, it is wise to keep equalizer settings above 50. The Flat option simply resets the equalizer table to all 255s. One good application of the equalizer is to attenuate high-pitched notes if they sound too sharp.

The Memory Clear function lets you rapidly annihilate a section of music or the entire music buffer. Enter the start and end block values at the prompts, then choose the increment value: 1 clears out all the bytes, while 5 only clears out the row of bytes the cursor was in before invoking this function. Be sure to set the cursor correctly before invoking this function and option! This function is also performed by a machine language subroutine.

The Label Block function creates a label of a single alphanumeric character that you specify at the prompt at the current block location. This is ignored by the music playing routine. The format of Label blocks is 253 in the control byte, then a flag of 1, then the ASCII code of the character. Bytes 4 and 5 aren't used. The Find Label function searches through the music buffer as far as the end block pointer and stops at the first occurrence of the specified label. These two functions make finding a certain spot in the music buffer a snap.

The Quit function allows you to exit the program in a single keystroke. The computer would usually be in the upper/lowercase and high-speed modes if you just pressed BREAK.

A NOP (no operation) Block function creates a block that does absolutely nothing and is ignored by the music playing routine. It can be used as a place holder for future or former blocks. Its format is 253 in the control byte, then a flag of 128. Bytes 3 to 5 aren't used.

Breakpoints can be set with the Breakpoint Block function. When the computer hits one of these while playing the music, it stops and waits for you to press a key, then continues. If you press BREAK, you are aborted to the BASIC driver program. This block accesses the ROM keyboard routine at low speed regardless of whether it is playing fast or slow. On some CoCos that can handle the high-speed pokes, this function would still crash due to a slow PIA IC for the keyboard. The format for these

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blocks is 253 in the control byte, then a flag of 16. Bytes 3 to 5 aren't used.

The Sync Block function is used in a block just preceding one where any two or more voices have to play the exact same note. At the prompts, respond "yes" to the voice numbers involved. Then, any synced voice's waveform table counter will be reset, and the voices playing the same note won't cancel out. There is a possibility of this happening if the voices aren't synced. You only need one sync block as long as each voice plays the same notes without separating. See Figure 6 to clarify the use of this function. The format of a sync block is 253 in the control byte, followed by a 2 for the sync flag. Bits 0 to 3 of Byte 3, when set, synchronize voices 1 to 4, respectively. Bytes 4 and 5 aren't used.

**Typical window configuration; exact values depend on tune.**

```
0:   16    SYN   32   32    SYN  128

1:  194     S  -194  192     S   170
2:  184     S   194  192     S   170
3:  178         174  178     S   170
4:  170         168  170     S  -170
```

**Figure 6: Use of Sync Block**

The Jump function jumps the window editor display to the current block specified at the prompt.

The Music Jump Block function creates a block that skips the music playing routine to the block specified, when encountered. This can be handy when placed at the beginning of a tune to change the position where the playing begins. This block is displayed in the same most/least significant byte fashion as is a tempo block. The value of the first byte times 256 plus the second equals the memory address of the destination block. If you have to determine the block number, subtract hexadecimal 4,000 (16,384) from the address and divide by five. This can be done by quitting or breaking out of the program to find the result (the variable `M` equals 16,384 throughout the program and can save you a few keystrokes in your calculations). Enter `GOTO1` to return to the program. The format for these blocks is 253 in the control byte, then a flag of 64, then the most and least significant bytes of the jump address. Byte 5 isn't used.

The Copy function allows you to duplicate sections of the music buffer without retyping them. At the prompts, enter the start and end block locations of the section to be copied, then the destination block (the first block location of the area you are copying to). The destination block cannot equal the start block, and no copied block can end up being copied to beyond block location 2,912, or this function will abort without copying.

For simple repeats, the Start and End Repeat Block functions are used at the beginning and end of the section you want to play twice. The repeat goes from the last Start Repeat block encountered to the first End Repeat block encountered. Extraneous repeats are ignored. The format for these blocks is a 253 in the control byte, then a flag of 4 for a Start Repeat or 8 for an End Repeat. Bytes 3 to 5 aren't used. More complicated repeat patterns can be emulated with the Copy command.

The Zing Here function "zings" the end block pointer to the current block. The Zing End function scans ahead from the current block until it hits a zero in the control byte, thereby determining the end block location. This function is also invoked after a run, copy, memory clear or load. The end block pointer is usually updated every time you do something to the music buffer (insert, delete, enter a number, set a control block, etc.).

The Save function lets you store your musical creation on cassette or disk. The Music option saves just the music buffer, while the more popular Music+Config option also saves the extra 4.5K preceding the music buffer where the envelope, waveform, equalizer and pitch tables are located. This is the most recommended save. The Config option saves just the tables. This can be used to store a favorite collection of waveforms and envelopes, saving you from having to redo them every time you run the program. Unless you are using the Config option, you must make sure that the end block pointer is set to the end block or one or two blocks higher. If it isn't, use either of the Zing functions to set it or data may be lost or you could waste valuable disk or cassette space. You are prompted for the filename. If it is not specified or exceeds eight characters, the save will be aborted. Disk users may want to change the `8` in Line 65 to `12` to allow filename extensions. You are then prompted for cassette or disk. The disk option won't execute if the controller is not plugged in.

The Load function loads a tune from cassette or tape. Enter the filename, which may be omitted if you are using cassette.

The Odd Files function lets you append a second file to the first, load a *CoCo Composer* tune, or load a *Music+* tune. It does this by setting the load offset according to the desired option, then jumping to the Load function. To append a file to a tune already in memory, make sure the file was saved without the tables, i.e., by the Music and not the Music+Config option under the Save function. Then choose the Append option. Make sure the end block pointer is set properly before invoking this function! *Bells and Whistles 2* can load files made by the *CoCo Composer* (Larry Konecky, December 1983) and *Music+* (Bob Ludlum, June 1984 and 1986). If you have these programs, you can easily convert your library of tunes to *Bells and Whistles 2* format. Then, with all of *Bells and Whistles 2*'s features, like envelopes, you can hear them like you've never heard them before! The discrepancy is that *Bells and Whistles 2*'s buffer begins at Hex 4000, while the *CoCo Composer*'s begins at Hex 2D00 and *Music+*'s begins at Hex 4F22. Therefore, the *CoCo Composer* and *Music+* options load the files with offsets of Hex 1300 and Hex -F22, respectively.

Once the files are loaded, you must use the Note Transposition function on the whole tune with an offset of +120 to bring the pitch values up to *Bells and Whistles 2* equivalents. Before you do this, however, make sure any note lengths of 253 or 254 are changed to 252. The *CoCo Composer* and *Music+* allow note lengths up to 254, but these will show up as erroneous control blocks in *Bells and Whistles 2* and would be ignored by the Note Transposition function.

Insert at least three spaces at the beginning of the tune for Tempo, Volume and E/W blocks. Add features to the song accordingly, like linking interpolated notes, throwing in labels, repeats, etc. Save the newly converted file in *Bells and Whistles 2* format with the Music+Config option. The conversion is now complete. Note that *Music+* and *CoCo Composer* files fill the upper two or three envelope tables with trash from their own tables when first loaded before conversion. This probably won't be any problem at all. I suggest you use a flat envelope for the voices unless you link the desired notes.

The Directory function does a disk directory print to the screen, so you can see the filenames if you can't remember them. This function won't execute if the disk controller isn't plugged in.

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The Display function is really neat. You can watch the window move when you play the music! The machine language subroutine takes a split second to print the window, but it still causes noticeable gaps between notes in the music. However, it is useful as a debugging tool. You won't be able to see it, though, with the Fast Play function unless you have a CoCo 3.

The Cancel function untoggles the display mode, and the music will play normally.

To make audio recordings of *Bells and Whistles 2*, my advice is to use a microphone or an in-line attenuator. Keep the mike away from the TV, as many will pick up the 60 Hz hum from the TV's circuitry. You can record through the jack on the CoCo's cassette cable, but weird things happen with the recorder's automatic level control. Volume changes become indistinguishable and the first second of the music sounds like a muffled explosion. To overcome the latter problem, the Klaxxon function sounds a loud tone for about a second to wake up the recorder's attenuating circuitry. Have the recorder on pause but with the record and play keys pressed. Sound the tone, then quickly release the pause and play the music.

The CoCo's audio DAC is six bits wide, yielding about 36 db of dynamic range. Low volume notes get flattened out, as do notes where the envelope trails off to nothing. This explains why notes sound different as they trail off. When the music playing routine finishes a piece of music, it resets the sound output to the TV or monitor. This may cause a "pop" in the TV or monitor and/or the cassette recorder. Simply put a long rest at the end of the music to give you a couple of seconds' leeway.

That wraps up the instructions for *Bells and Whistles 2*. This program is the product of almost three years of programming and debugging. If you have any problems, I'll try to help. You can send an SASE to me at 26 Alfred Street, Napanee, Ontario, Canada K7R-3H7.

CoCo users need no longer be taunted by their friends who have other computers and belittle the CoCo's `PLAY` command. I hope you enjoy this versatile and superior synthesizer program! ☐

**Editor's Note: Two music files, `AXEL F` and `ENTRTANR`, will be included on this month's RAINBOW ON TAPE and RAINBOW ON DISK.**

| | | | | | |
|---|---|---|---|---|---|
| 10 | 36 | 85 | 188 | 141 | 19 |
| 26 | 80 | 95 | 18 | 145 | 183 |
| 41 | 31 | 106 | 75 | 151 | 148 |
| 53 | 210 | 115 | 104 | 155 | 125 |
| 63 | 42 | 130 | 65 | 161 | 70 |
| 74 | 57 | 136 | 141 | END | 75 |

**Listing 1:** `BW2`

```
0 GOTO72
1 GOSUB2:GOTO5
2 CLS3:PRINT">>>>> BELLS AND WHI
STLES 2 <<<<<";:PRINT@128,"0:";:
PRINT@192,"1:";:PRINT@224,"2:";:
PRINT@256,"3:";:PRINT@288,"4:";:
PRINT@32,STRING$(32,191);:PRINT@
384,STRING$(32,191);:I$=STRING$(
4,166):PRINT@335,I$;:PRINT@175,I
$;:PRINT@111,I$;
3 PRINT@416,STRING$(69,32);:POKE
1535,96:PRINT@485,"BY MATTHEW A.
 THOMPSON    ";:RETURN
4 POKEII,INT(I/256):POKEII+1,I-2
56*INT(I/256):RETURN
5 GOSUB3:POKEHS,0:GOTO7
6 PRINT@352,"COMMAND?":PRINT@64,
"CURRENT BLOCK: ";:PRINTUSING"##
##";(CB-M)/5:PRINT@85,"END: ";:P
RINTUSING"####";(EB-M)/5:RETURN
7 GOSUB6
8 I=CB:II=&H7C8F:GOSUB4:EXEC&H7C
92
9 POKE282,0:POKE343,255:POKE344,
255:I$=INKEY$:IFI$<>""THEN11ELSE
POKECM(CU)+CC,PEEK(CM(CU)+CC)-64
:FORQT=1TO30:NEXT:POKECM(CU)+CC,
PEEK(CM(CU)+CC)+64
10 CC=CC+CS:IFCC>2ORCC<1THENCS=-
CS:IFI$=""THEN9
11 IFI$=CHR$(8)ANDCB>M THENCB=CB
-5:POKE&H87,0:GOTO7
12 IFI$=CHR$(9)ANDCB<&H78E0 THEN
CB=CB+5:POKE&H87,0:GOTO7
13 IFI$=CHR$(10)ANDCU<4THENCU=CU
+1
14 IFI$="^"ANDCU>0THENCU=CU-1
15 IFI$>="0"ANDI$<="9"THEN18
16 IFI$<>""THENONINSTR(1,CM$,I$)
GOTO31,33,34,35,112,36,79,40,113
,114,109,42,41,48,49,53,55,56,59
,60,61,64,129,57,71,115,125,130,
51,50,129,77,52,107
17 GOTO9
18 PRINT@361,I$:PRINT@CM(CU)-102
4," ???";:N$=I$
19 I$=INKEY$:IFI$=""THEN19
20 IFI$=" "THEN7
21 IFI$>="0"ANDI$<="9"THENN$=N$+
I$:PRINT@361,N$
22 N=VAL(N$)
23 IFN>255THENPLAY"T2L16O1V4C":G
OTO7
24 IFPEEK(CB)>252AND(I$=CHR$(13)
ORI$="@")THENPOKECB+CU,N:GOTO29
25 IFCU=0AND(I$=CHR$(13)ORI$="@"
)THENPOKECB,N:GOTO29
26 IFI$=CHR$(13)THENPOKECB+CU,N:
GOTO29
27 IFI$="@"ANDN<255THENPOKECB+CU
,N+1:GOTO29
28 GOTO19
29 IFEB<CB THENEB=CB
30 GOTO5
31 I=&H79A9:POKELS,0:POKE32766,0
32 POKE282,255:EXECI:POKEHS,0:GO
TO1
```

```
33 I=&H7C50:POKE32766,1:GOTO32
34 PRINT@352,"INSERT":I=CB+5:II=
&H7C69:GOSUB4:EXEC&H7C5A:FORI=CB
 TOCB+4:POKEI,0:NEXT:EB=EB+5:GOT
O7
35 PRINT@352,"DELETE":I=CB:II=&H
7C78:GOSUB4:EXEC&H7C6B:IFEB>CB T
HENEB=EB-5:GOTO7ELSE7
36 PRINT@352,"ENVELOPE/WAVEFORM
BLOCK":FORI=1TO4
37 PRINT@416,"VOICE"I"ENVELOPE";
:INPUTII:II=FIX(ABS(II)):IFII>7T
HEN5ELSEII=II*8
38 PRINT@448,"VOICE"I"WAVEFORM";
:INPUTIC:IC=FIX(ABS(IC)):IFIC>7T
HEN5ELSEPOKECB+I,IC+II
39 NEXT:POKECB,255:GOTO29
40 PRINT@352,"JUMP":PRINT@416,;:
INPUT"TO WHAT BLOCK";I:I=FIX(ABS
(I)):IFI>2912THEN5ELSECB=I*5+M:G
OTO5
41 PRINT@352,"FREQUENCY TRANSPOS
ATION":PRINT@416,"SEMITONES FROM
 A=440 HZ";:INPUTOF:IFOF>256OROF
<-256THEN5ELSEGOSUB75:GOTO5
42 PRINT@352,"MEMORY CLEAR":PRIN
T@416,"START BLOCK";:INPUTSB:SB=
FIX(ABS(SB)):IFSB>2912THEN5
43 INPUT"END BLOCK";TB:TB=FIX(AB
S(TB)):IFTB>2912THEN5
44 GOSUB3:PRINT@416,"INCREMENT";
:INPUTIC:IC=FIX(ABS(IC)):IFIC<>1
ANDIC<>5THEN5
45 I=SB*5+M:IFIC=5THENI=I+CU
46 II=&H7C8A:GOSUB4:I=TB*5+M:IFI
C=5THENI=I+CU ELSEI=I+4
47 II=&H7C8C:GOSUB4:POKE&H7C8E,I
C:EXEC&H7C7A:GOTO56
48 PRINT@352,"TEMPO":PRINT@416,;
:INPUT"TEMPO";QT:QT=ABS(FIX(QT))
:IFQT>65535THEN5ELSEI=QT:II=CB+2
:GOSUB4:POKECB,253:POKECB+1,32:G
OTO29
49 PRINT@352,"LABEL":POKE282,255
:PRINT@416,"HIT LABEL KEY.":GOSU
B78:I=ASC(QW$):IFI<33ORI>90THEN5
ELSEPOKECB,253:POKECB+1,1:POKECB
+2,I:GOTO29
50 POKE32767,0:GOTO9
51 POKE32767,1:GOTO9
52 SOUND50,30:GOTO9
53 PRINT@352,"FIND":PRINT@416,"H
IT LABEL TO FIND.":POKE282,255:G
OSUB78
54 I=ASC(QW$):IFI<33ORI>90THEN5E
LSEPRINT@357,CHR$(I):FORII=M TOE
B+5STEP5:IFPEEK(II+2)<>I THENNEX
T:GOTO5ELSEIFPEEK(II+1)=1ANDPEEK
(II)=253THENCB=II:GOTO5ELSENEXT:
GOTO5
55 POKECB,254:GOTO29
56 FORI=CB TO&H78F0 STEP5:IFPEEK
(I)=0THENEB=I:GOTO1ELSENEXT:GOTO
1
57 PRINT@352,"SYNCHRONIZATION":I
I=0:FORI=1TO4:PRINT@416,"VOICE"I
" (1=Y,0=N)?":GOSUB78:IFQW$<>"0"
ANDQW$<>"1"THEN5
58 II=II+VAL(QW$)*2^(I-1):NEXT:P
OKECB,253:POKECB+1,2:POKECB+2,II
:GOTO29
59 PRINT@352,"MUSIC JUMP":PRINT@
416,;:INPUT"TO WHAT BLOCK";I:I=F
IX(ABS(I)):IFI>2912THEN5ELSEI=M+
I*5:POKECB,253:POKECB+1,64:II=CB
+2:GOSUB4:GOTO29
60 POKECB,253:POKECB+1,4:GOTO29
61 POKECB,253:POKECB+1,8:GOTO29
62 POKE282,255:PRINT@352,"LOAD":
GOSUB3:PRINT@416,;:LINEINPUT"TIT
LE: ";I$:IFLEN(I$)>8THEN5ELSEPOK
ELS,0:GOSUB128:IFQW$="1"THENCLOA
DM""+I$,I ELSEIFQW$="2"ANDMEM<70
0THENLOADM""+I$,I ELSE5
63 POKEHS,0:CB=M:PRINT@357,"COMP
LETED... WAIT.":GOTO56
64 POKE282,255:PRINT@352,"SAVE":
PRINT@416,"1) MUSIC","2) MUSIC+C
ONFIG","3) CONFIG":GOSUB78:QT=VA
L(QW$):IFQT=1THENI=M:II=EB+9ELSE
IFQT=2THENI=S:II=EB+9ELSEIFQT=3T
HENI=S:II=M-1ELSE5
65 GOSUB3:PRINT@416,"TITLE: ";:L
INEINPUTI$:IFI$=""ORLEN(I$)>8THE
N5ELSEPOKELS,0
66 GOSUB128:IFQW$="1"THEN69
67 IFQW$<>"2"ORMEM>700THEN5ELSES
AVEM""+I$,I,II,40999
68 GOTO70
69 CSAVEM""+I$,I,II,40999
70 POKEHS,0:GOTO5
71 POKECB,253:POKECB+1,128:GOTO2
9
72 IFPEEK(&H7908)<>134ORPEEK(&H7
909)<>121THEN135
73 CLEAR175,&H2DFF:HS=65495:LS=6
5494:POKEHS,0:M=&H4000:W=&H3000:
E=&H3800:S=&H2E00:EQ=&H2F00:CB=M
:EB=M:CC=0:CS=1:IFPEEK(&H7906)<>
52ORPEEK(&H7907)<>126THEN133
74 CLS3:PRINT@237," WAIT ";:I=11
67:CM(0)=I:CM(1)=I+64:CM(2)=I+96
:CM(3)=I+128:CM(4)=I+160:CU=0:CM
$="pPiDbWwjzQCMFtlfvZJseSLyNn-=d
co\k"+CHR$(12):POKEHS,0:GOTO56
75 QT=31214.74003*(1.0594631^OF)
:FORII=S+254TOS STEP-2:I=QT:IFI>
32768THENI=32768
```

```
76 GOSUB4:QT=QT/1.0594631:NEXT:R
ETURN
77 IFMEM<700THENCLS:POKELS,0:DIR
:POKEHS,0:GOSUB78:GOTO1ELSE9
78 QW$=INKEY$:IFQW$=""THEN78ELSE
RETURN
79 PRINT@352,"ENVELOPE/WAVEFORM
CREATE":PRINT@416,"W)AVEFORMS",,
"E)NVELOPES":GOSUB78:IFQW$="e"TH
EN98
80 IFQW$<>"w"THEN5
81 CLS:PRINT"1) GRAPHIC",,"2) SI
NE HARMONICS","3) SQUARE",,"4) S
AWTOOTH",,"5) TRIANGLE",,"6) JUS
T CHECKING","7) NOISE/PERCUSSION
","8) BYTE BY BYTE":GOSUB78:QT=V
AL(QW$):IFQT<1ORQT>8THEN1
82 GOSUB108:IFI>7THEN1
83 OF=W+I*256:ONQT GOTO84,89,94,
95,96,97,132,105
84 QT=0:CLS0:II=0:FORI=OF TOOF+2
55STEP4
85 I$=INKEY$:IFI$=CHR$(94)ANDQT<
=247THENQT=QT+8ELSEIFI$=CHR$(10)
ANDQT>=8THENQT=QT-8
86 FORSB=0TO3:POKEI+SB,QT:NEXT:S
B=31-(QT/8-.875):SET(II,SB,5):IF
SB>=1THENRESET(II,SB-1)
87 IFSB<31THENRESET(II,SB+1)
88 IFI$=CHR$(9)THENII=II+1:NEXT:
GOTO97ELSE85
89 CLS:PRINT"INPUT HARMONIC WEIG
HTS (0-1):":PRINT:FORI=1TO10:PRI
NTI;:INPUTZ(I):IFZ(I)<0ORZ(I)>1T
HEN1
90 NEXT:CLS0:I=0:IC=0:FORQT=OF T
OOF+255:FORII=1TO10:Y(II)=COS(I*
II)*Z(II)
91 NEXTII:SB=INT(127-126*((Y(1)+
Y(2)+Y(3)+Y(4)+Y(5)+Y(6)+Y(7)+Y(
8)+Y(9)+Y(10))/(Z(1)+Z(2)+Z(3)+Z
(4)+Z(5)+Z(6)+Z(7)+Z(8)+Z(9)+Z(1
0)))):POKEQT,SB:IFSB>IC THENIC=S
B
92 I=I+3.1415926/128:IFQT/4=FIX(
QT/4)THENSET((QT-OF)/4,31-(PEEK(
QT)/8-.875),5)
93 NEXTQT:IC=255/IC-((255/IC)/25
4):FORI=OF TOOF+255:POKEI,INT(PE
EK(I)*IC):NEXT:GOTO97
94 FORI=OF TOOF+127:POKEI+128,25
5:POKEI,0:NEXT:GOTO97
95 FORI=OF TOOF+255:POKEI,I-OF:N
EXT:GOTO97
96 FORI=OF TOOF+127:POKEI,2*(I-O
F):POKEI+128,255-2*(I-OF):NEXT:G
OTO97
97 CLS0:IC=0:FORI=OF TOOF+255STE
P4:SET(IC,31-(PEEK(I)/8-.875),2)
:IC=IC+1:NEXT:QW$=INKEY$:GOSUB78
:GOTO1
98 CLS:PRINT"1) EXPONENTIAL DECA
Y","2) FLAT",,"3) GRAPHIC",,"4)
JUST CHECKING","5) BYTE BY BYTE"
:GOSUB78:QT=VAL(QW$):IFQT<1ORQT>
5THEN1
99 GOSUB108:IFI>7THEN1ELSEOF=E+I
*256
100 ONQT GOTO101,106,84,97,105
101 PRINT:INPUT"DECAY VALUE";SB:
SB=ABS(SB):IFSB<1THEN1
102 PRINT"1) ABSOLUTE","2) RELAT
IVE":GOSUB78:IFQW$<"1"ORQW$>"2"T
HEN1
103 II=255:IFQW$="1"THENQT=0:INP
UT"STRUM FACTOR";IC:IC=FIX(ABS(I
C)):IFIC<1ORIC>256THEN1ELSEFORI=
OF TOOF+255:POKEI,II:II=II/SB:QT
=QT+1:IFQT=IC THENQT=0:II=255:NE
XT:GOTO97ELSENEXT:GOTO97
104 FORI=OF TOOF+255:POKEI,II/25
5*PEEK(I):II=II/SB:NEXT:GOTO97
105 PRINT:FORI=OF TOOF+255:PRINT
"BYTE"I-OF"(0-255)";:INPUTII:II=
```

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```
FIX(ABS(II)):IFII>255THEN1ELSEPO
KEI,II:NEXT:GOTO97
106 FORI=OF TOOF+255:POKEI,255:N
EXT:GOTO97
107 POKECB+CU,0:GOTO8
108 PRINT:PRINT"WHICH TABLE (0-7
)":GOSUB78:IFQW$<"0"ORQW$>"7"THE
NI=9:RETURNELSEI=VAL(QW$):RETURN
109 PRINT@352,"COPY":PRINT@416,"
START";:INPUTSB:SB=FIX(ABS(SB)):
IFSB>2912THEN5ELSEINPUT"END";TB:
TB=FIX(ABS(TB)):IFTB>2912ORTB<SB
 THEN5ELSEGOSUB3:PRINT@416,"COPY
 TO";:INPUTIC:IC=FIX(ABS(IC)):IF
IC>2912ORIC=SB ORIC+TB-SB>2912TH
EN5
110 SB=SB*5+M:TB=TB*5+M+4:IC=IC*
5+M:IFIC<SB THENFORI=SB TOTB:POK
EIC+I-SB,PEEK(I):NEXTELSEFORI=TB
 TOSB STEP-1:POKEIC+I-SB,PEEK(I)
:NEXT
111 GOTO56
112 POKECB,253:POKECB+1,16:GOTO2
9
113 EB=CB:GOTO7
114 POKE282,255:POKELS,0:CLS:END
115 PRINT@352,"NOTE TRANSPOSATIO
N":PRINT@416,"WHICH VOICE (1-4,
5=ALL)?":GOSUB78:QQ=VAL(QW$):IFQ
Q=0ORQQ>5THEN5
116 INPUT"START BLOCK";SB:SB=FIX
(ABS(SB)):IFSB>2912THEN5
117 GOSUB3:PRINT@416,"END BLOCK"
;:INPUTTB:TB=FIX(ABS(TB)):IFTB>2
912ORTB<SB THEN5
118 PRINT@448,"TRANSPOSATION VAL
UE":PRINT@467,;:INPUTIC:IC=2*FIX
(IC/2)
119 FORI=M+5*SB TOM+5*TB STEP5:I
FQQ<5THENII=QQ:GOTO121
120 FORII=1TO4
121 QT=II+I:OF=PEEK(QT):IFPEEK(I
)<253ANDOF<>0ANDOF+IC>1ANDOF+IC<
256THENPOKEQT,OF+IC
122 IFQQ<5THEN124
123 NEXTII
124 NEXTI:GOTO5
125 IFPEEK(CB)>252ORCU=0THEN9
126 I=PEEK(CB+CU):IF(I AND1)=1TH
ENPOKECB+CU,I-1ELSEPOKECB+CU,I+1
127 POKE343,255:IFINKEY$="-"THEN
127ELSE8
128 GOSUB3:PRINT@416,"1) CASSETT
E OR 2) DISK?":GOSUB78:RETURN
129 IFI$="L"THENI=0:GOTO62ELSEPR
INT@352,"ODD FILES":PRINT@416,"1
) APPEND","2) MUSIC+","3) COCO C
OMPOSER";:GOSUB78:IFQW$="3"THENI
=&H1300:GOTO62ELSEIFQW$="2"THENI
=&HF0DE:GOTO62ELSEIFQW$="1"THENI
=EB-M:GOTO62ELSE5
130 CLS:PRINT"1) FLAT OR 2) CUST
OM":GOSUB78:IFQW$<"1"ORQW$>"2"TH
EN1ELSEIFQW$="1"THENFORI=EQ TOEQ
+255:POKEI,255:NEXT:GOTO1
131 FORI=0TO127:PRINTFIX((I+.5)/
256*6172);"HZ (0-255)";:INPUTII:
II=FIX(ABS(II)):IFII>255THEN1ELS
EPOKEI+EQ,II:NEXT:GOTO1
132 FORI=OF TOOF+255:POKEI,RND(2
55):NEXT:GOTO97
133 CLS:PRINT@0,">>>>> BELLS AND
 WHISTLES 2 <<<<<",,"TABLES ARE
BEING INITIALIZED.  WHEN DONE,
PLEASE TYPE 'RUN'   AGAIN.":POK
E&H7906,52:POKE&H7907,126:FORI=E
Q TOEQ+255:POKEI,255:NEXT
134 OF=0:GOSUB75:II=&H7C8A:I=&H3
000:GOSUB4:I=&H7900:II=&H7C8C:GO
SUB4:POKE&H7C8E,1:EXEC&H7C7A:FOR
I=&H3000 TO&H307F:POKEI,0:POKEI+
128,255:POKEI+&H800,255:POKEI+&H
880,255:NEXT:PRINT:DEL133-134
135 CLS:PRINT">>>>> BELLS AND WH
```

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ZED.  WHEN DONE,  PLEASE TYPE 'R
UN' AGAIN."
136 PRINT"BELLS AND WHISTLES 2 I
S THE BESTSOUNDING, ALL-SOFTWARE
 MUSIC    SYNTHESIZER FOR THE CO
CO IN THE ENTIRE WORLD AS OF DEC
EMBER '86!":CLEAR150,&H7000:FORI
=&H7900 TO&H7FFF:READI$:POKEI,VA
L("&H"+I$):NEXT:DEL135-
137 DATA 0,0,0,0,0,0,0,0,86,79,1
F,8B,CE,0,0,10,8E,0,0,8E,30,80,C
C,80,0,C3,0,0,DD,17,A6,86,8E,38,
80,C6,80,E6,85,3D,C6,0,3D,97,46,
8E,30,80,CC,80,0,C3,0,0,DD,31,A6
,86,8E,38,80,C6,80,E6
138 DATA 85,3D,C6,0,3D,8B,0,97,6
2,8E,30,80,CC,80,0,C3,0,0,DD,4D,
A6,86,8E,38,80,C6,80,E6,85,3D,C6
,0,3D,8B,0,97,7E,8E,30,80,CC,80,
0,C3,0,0,DD,69,A6,86,8E,38,80,C6
,80,E6,85,3D,C6,0,3D,8B,0,B7
139 DATA FF,20,33,41,11,83,0,64,
26,14,CE,0,0,31,3F,26,3,35,7E,39
,C,24,C,3E,C,5A,C,76,E,13,3D,3D,
3D,21,FB,21,F9,7E,79,13,0,BD,7C,
1E,10,BE,7C,11,8E,2E,0,CE,2F,0,C
C,80,0,FD,79,17,FD,79,31,FD
140 DATA 79,4D,FD,79,69,7F,7C,17
,7D,7F,FF,27,B,34,7E,10,BF,7C,8F
,BD,7C,92,35,7E,E6,A0,C1,0,10,27
,2,2D,C1,FD,10,24,0,F2,4F,FD,79,
11,E6,A0,27,C,C5,1,26,7,86,80,B7
,79,24,20,1,5A,5D,26,F,CC,0,0
141 DATA FD,79,1A,CC,79,A8,F7,79
,95,7E,7A,24,4F,EC,8B,FD,79,1A,B
D,7C,1A,E6,CB,B6,7C,13,3D,B7,79,
29,CC,79,24,F7,79,95,E6,A0,27,C,
C5,1,26,7,86,80,B7,79,3E,20,1,5A
,5D,26,F,CC,0,0,FD,79,34,CC,79,A
8
142 DATA F7,79,97,7E,7A,5E,4F,EC
,8B,FD,79,34,BD,7C,1A,E6,CB,B6,7
C,14,3D,B7,79,43,CC,79,3E,F7,79,
97,E6,A0,27,C,C5,1,26,7,86,80,B7
,79,5A,20,1,5A,5D,26,F,CC,0,0,FD
,79,50,CC,79,A8,F7,79,99,7E,7A,9
8
143 DATA 4F,EC,8B,FD,79,50,BD,7C
,1A,E6,CB,B6,7C,15,3D,B7,79,5F,C
C,79,5A,F7,79,99,E6,A0,27,C,C5,1
,26,7,86,80,B7,79,76,20,1,5A,5D,
26,F,CC,0,0,FD,79,6C,CC,79,A8,F7
,79,9B,7E,7A,D2,4F,EC,8B,FD,79,6
C
144 DATA BD,7C,1A,E6,CB,B6,7C,16
,3D,B7,79,7B,CC,79,76,F7,79,9B,B
D,79,6,7E,79,C8,C1,FE,26,17,E6,A
0,F7,7C,13,E6,A0,F7,7C,14,E6,A0,
F7,7C,15,E6,A0,F7,7C,16,7E,79,C8
,C1,FF,26,61,A6,A0,34,2,84,7,C6,
80,C3
145 DATA 30,0,FD,79,14,35,2,47,4
7,47,C3,38,0,FD,79,21,A6,A0,34,2
,84,7,C3,30,0,FD,79,2E,35,2,47,4
7,47,C3,38,0,FD,79,3B,A6,A0,34,2
,84,7,C3,30,0,FD,79,4A,35,2,47,4
7,47,C3,38,0,FD,79,57,A6,A0
146 DATA 34,2,84,7,C3,30,0,FD,79
,66,35,2,47,47,47,C3,38,0,FD,79,
73,7E,79,C8,A6,A0,85,1,10,26,0,2
9,85,2,10,26,0,48,85,4,10,26,0,6
C,85,8,10,26,0,74,85,10,10,26,0,
16,85,20,10,26,0,85,85,40
147 DATA 10,26,0,78,31,23,7E,79,
C8,31,23,7E,79,C8,31,23,34,60,B7
,FF,D8,AD,9F,A0,0,27,FA,7D,7F,FE
,27,3,B7,FF,D9,35,60,81,3,10,27,
0,62,7E,79,C8,34,10,8E,80,0,E6,A
4,C5,1,27,3,BF,79,17,C5,2,27,3
148 DATA BF,79,31,C5,4,27,3,BF,7
9,4D,C5,8,27,3,BF,79,69,35,10,31
,23,7E,79,C8,31,23,10,BF,7C,18,8
6,FF,B7,7C,17,7E,79,C8,B6,7C,17,
81,0,27,A,7F,7C,17,10,BE,7C,18,7
E,79,C8,31,23,7E,79,C8,EC,A4,1F,
2
149 DATA 7E,79,C8,EC,A4,FD,79,86
,31,23,7E,79,C8,BD,7C,37,39,40,0
,3F,40,40,40,0,0,0,1F,89,4F,39,B
6,FF,3,84,F6,B7,FF,3,B6,FF,1,84,
F7,B7,FF,1,B6,FF,23,8A,8,B7,FF,2
3,39,B6,FF,3,8A,9,B7,FF,3,B6
150 DATA FF,1,8A,8,B7,FF,1,B6,FF
,23,84,F7,B7,FF,23,39,B7,FF,D9,B
D,79,A9,B7,FF,D8,39,8E,79,0,A6,1
B,A7,84,30,1F,BC,7C,69,24,F5,39,
40,0,BE,7C,78,A6,5,A7,80,8C,79,0
,23,F7,39,40,0,BE,7C,8A,F6,7C,8E
151 DATA 6F,84,30,85,BC,7C,8C,23
,F7,39,40,0,78,FC,1,40,0,0,7F,7C
,91,10,BE,7C,8F,31,31,FC,7C,8F,C
3,0,14,FD,7C,8F,10,8C,40,0,25,5B
,10,8C,79,4,22,55,10,BC,7C,8F,25
,1,39,A6,A0,81,FC,22,6B,4D,27,11
152 DATA 1F,89,BD,7F,79,BD,7F,D2
,8E,7F,B5,BD,7F,D,7E,7C,D7,8E,7E
,E6,BD,7F,D,7F,7E,FA,E6,A0,5D,10
,27,0,AA,C5,1,26,6,BD,7F,D2,7E,7
C,EF,5A,BD,7F,DC,BD,7F,79,8E,7F,
B5,BD,7F,D,7C,7E,FA,B6,7E,FA,81,
4
153 DATA 25,D8,7E,7C,A4,8E,7E,DE
,BD,7F,D,8E,7E,DE,BD,7F,D,8E,7E,
DE,BD,7F,D,8E,7E,DE,BD,7F,D,8E,7
E,DE,BD,7F,D,31,25,7E,7C,A4,81,F
F,25,37,8E,7E,C6,BD,7F,D,BD,7F,D
2,7F,7E,FA,86,2C,B7,7F,B7,A6,A4,
84
154 DATA 7,8B,30,B7,7F,B8,A6,A0,
44,44,44,8B,30,B7,7F,B6,8E,7F,B5
,BD,7F,D,7C,7E,FA,B6,7E,FA,81,4,
25,DD,7E,7C,A4,81,FE,25,2D,8E,7E
.F6,BD,7F,D,BD,7F,D2,7F,7E,FA,E6
,A0,BD,7F,79,8E,7F,B5,BD,7F,D,7C
,7E
155 DATA FA,B6,7E,FA,81,4,25,EB,
7E,7C,A4,8E,7E,E6,BD,7F,D,7E,7C,
F8,A6,A0,85,1,10,26,0,47,85,2,10
,26,0,74,85,4,10,26,0,B5,85,8,10
,26,0,D2,85,10,10,26,0,D2,85,20,
10,26,1,6,85,40,10,26,0,CC
156 DATA 8E,7E,EA,BD,7F,D,8E,7E,
E2,BD,7F,D,8E,7E,E2,BD,7F,D,8E,7
E,E2,BD,7F,D,8E,7E,E2,BD,7F,D,31
,23,7E,7C,A4,8E,7E,CA,BD,7F,D,A6
,A0,C6,20,F7,7F,B5,F7,7F,B6,F7,7
F,B8,B7,7F,B7,8E,7F,B5,BD,7F,D,8
E
157 DATA 7E,E2,BD,7F,D,8E,7E,E2,
BD,7F,D,8E,7E,E2,BD,7F,D,31,22,7
E,7C,A4,8E,7E,CE,BD,7F,D,7F,7E,F
A,7F,7E,5C,7C,7E,5C,C6,20,F7,7F,
B5,F7,7F,B6,F7,7F,B8,C6,53,F7,7F
,B7,A6,A4,B5,7E,5C,26,8,8E,7E,E2
,BD
158 DATA 7F,D,20,6,8E,7F,B5,BD,7
F,D,78,7E,5C,7C,7E,FA,B6,7E,FA,8
1,4,25,DE,31,23,7E,7C,A4,1,8E,7E
,EE,BD,7F,D,8E,7E,E2,BD,7F,D,8E,
7E,E2,BD,7F,D,8E,7E,E2,BD,7F,D,8
E,7E,E2,BD,7F,D,31,23,7E,7C,A4
159 DATA 8E,7E,F2,7E,7E,60,8E,7E
,DA,7E,7E,60,8E,7E,D6,BD,7F,D,EC
,A1,34,4,1F,89,BD,7F,D2,BD,7F,79
,8E,7F,B5,BD,7F,D,35,4,BD,7F,79,
8E,7F,B5,BD,7F,D,8E,7E,E2,BD,7F,
D,8E,7E,E2,BD,7F,D,31,21,7E,7C,A
4
160 DATA 8E,7E,D2,7E,7E,8F,20,45
,2F,57,20,4C,41,42,20,53,59,4E,2
0,54,4D,50,20,4A,4D,50,20,42,52,
4B,AF,AF,AF,AF,20,20,20,20,20,20
,2E,20,20,4E,4F,50,20,53,52,54,2
0,45,52,54,20,56,4F,4C,0,34,12,4
F,E6,61
161 DATA 8D,5D,E7,61,E6,62,8D,57
,E7,62,35,14,39,F6,7C,91,C1,23,2
5,1,39,CE,7F,27,E6,C5,4F,C3,4,83
,DD,88,BD,7F,4A,7C,7C,91,39,0,40
,60,80,A0,4,44,64,84,A4,8,48,68,
88,A8,C,4C,6C,8C,AC,10,50,70,90,
B0
162 DATA 14,54,74,94,B4,18,58,78
,98,B8,7F,7F,5E,A6,80,7C,7F,5E,A
D,9F,A0,2,F6,7F,5E,C1,4,25,F0,39
,0,8E,0,8,58,49,CA,1,24,4,A0,62,
20,8,A0,62,24,4,C4,FE,AB,62,30,1
F,26,EA,39,4F,1F,1,86,64,BD,7E
163 DATA FB,BF,7F,B0,1F,89,4F,1F
,1,86,A,BD,7E,FB,BF,7F,B2,B7,7F,
B4,FC,7F,B0,CB,30,F7,7F,B6,FC,7F
,B2,CB,30,F7,7F,B7,F6,7F,B4,CB,3
0,F7,7F,B8,BD,7F,B9,39,0,0,0,0,0
,20,20,20,20,B6,7F,B6,C6,20,81,3
0
164 DATA 27,1,39,F7,7F,B6,B6,7F,
B7,81,30,27,1,39,F7,7F,B7,39,34,
2,86,20,B7,7F,B5,35,2,39,34,2,86
,2D,B7,7F,B5,35,2,39,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0
```

**Listing 2:** BW2C3FIX

```
84 QT=0:HSCREEN2:PALETTE0,0:HCOL
OR1:HLINE(30,60)-(290,191),PSET,
B:II=32:FORI=OF TOOF+255
85 I$=INKEY$:IFI$=CHR$(94)ANDQT<
=253THENQT=QT+2ELSEIFI$=CHR$(10)
ANDQT>=2THENQT=QT-2
86 POKEI,QT:SB=FIX(189-QT/2):HSE
T(II,SB,4):HRESET(II,SB-1)
87 HRESET(II,SB+1)
90 NEXT:HSCREEN2:PALETTE0,0:HCOL
OR1:HLINE(30,60)-(290,191),PSET,
B:I=0:IC=0:FORQT=OF TOOF+255:FOR
II=1TO10:Y(II)=COS(I*II)*Z(II)
92 I=I+3.1415926/128:HSET(QT-OF+
32,189-PEEK(QT)/2,4)
97 HSCREEN2:PALETTE0,0:HCOLOR1:H
LINE(30,60)-(290,191),PSET,B:IC=
32:FORI=OF TOOF+255:HSET(IC,189-
PEEK(I)/2,4):IC=IC+1:NEXT:QW$=IN
KEY$:GOSUB78:HSCREEN0:PALETTE0,1
8:GOTO1
```

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# Play It Again, RAM

*The new Color Computer owner buys his/her versatile machine for its graphics and music capabilities, organization of their home and office, educational purposes — both in the home and school and to acquire programming knowledge — and some, simply for pure fun and entertainment.*

*As far as the CoCo is concerned, the more you learn, the more you realize how little you actually know. That is why every session at the keyboard is an adventure in learning.*

*THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.*

*Contributions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.*

*Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.*

**— Jutta Kapfhammer**
**Submissions Editor**

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## New Mexican Folk Dances

16K
ECB

### By Julian Josue Vigil

Almost everyone knows the tune of "La Varsoviana (The Girl from Warsaw)", or at least has made an attempt to tap their foot to the beat. Other Mexican tunes may not be so well-known, but are just as charming.

The following folk dances were compiled with reference to Mela Sedillo's *Mexican and New Mexican Folkdances* (Albuquerque, New Mexico: 1950). The arrangements are basically identical to those in Sedillo's book, with two minor changes: a triplet of eighth notes in "La Varsoviana" is given a length value of L9 instead of L8, and the quarter note beginning "La Raspa" has been replaced with an eighth rest and eighth note for a smooth replay in Line 7111.

The following programs can be typed individually or incorporated into one main program by putting all the listings together. These nine files will be combined on RAINBOW ON TAPE and RAINBOW ON DISK.

**The listing:** FOLKSONG
***La Varsoviana***

```
0 CLS
5 FOR D=1 TO 750:NEXT D
10 PRINT @200, "LA VARSOVIANA."
25 FOR D=1 TO 1500:NEXT D
110 A$="T3O2L8DGB;O3EDO2BDGB;O3E
DO2BDGB;O3EDO2BO3DCO2B;L4.AL8DF#
AO3DCO2ADF#A;O3DCO2ADF#A;O3F#EDC
O2BA;L2GL4D;"
111 PLAY A$
120 B$="O2L4BL8BA#BO3C;O2L2AL4D;
AL8AG#AB;L2GL4D;BL8BA#BO3C;O2L4.
AO3L9DDD;L8F#EDCO2BA;L2.G;"
121 PLAY B$
130 PLAY A$
140 PLAY B$
```

***El Chote***

```
1000 CLS
1005 FOR D=1 TO 750:NEXT D
```

```
1010 PRINT @203, "EL CHOTE."
1025 FOR D=1 TO 1500:NEXT D
1110 C$="T3O2L8GF;EGO3EDCO2GEG;L
4EBL2B;L4FBL8BGAB;O3L4CECO2L8GF;
EGO3EDCO2BEG;L4FBL2B;L4FBL8BGAB;
O3L4CECP4;"
1111 PLAY C$
1120 D$="O3L4DO2AO3DO2A;L8BO3CO2
BGL2D;O3L4CO2AO3CO2A;L8GF#GAL2B;
O3L4DO2AO3DO2A;L8BO3CO2BGL2D;O3L
4CO2AO3CO2A;L8GF#GAL2G;"
1121 PLAY D$
1130 PLAY C$
1140 PLAY D$
```

### La Vaquerita

```
2000 CLS
2005 FOR D=1 TO 750:NEXT D
2010 PRINT @201, "LA VAQUERITA."
2025 FOR D=1 TO 1500:NEXT D
2110 E$="T5O2L2CF;L4AAAG;L2AL4FA
;O3L2CO2L4B-G;O3L2CO2L4B-G;L4AB-
AG;L2FL4CF;AAAG;L2AL4FA;O3L2CO2L
4B-G;O3L2CO2L4B-G;AB-AG;L2F"
2111 PLAY E$
2120 F$="O3L4FE;DDDO2B-;O3L2DL4E
D;CCCO2A;O3L2CO2L4FA;O3L2CO2L4B-
G;O3L2CO2L4B-G;AB-AG;L2FO3L4FE;D
DDO2B-;O3L2DL4ED;CCCO2A;O3L2CO2L
4FA;O3L2CO2L4B-G;O3L2CO2L4B-G;AB
-AG;L1F;"
2121 PLAY F$
2130 PLAY E$
2140 PLAY F$
```

### La Cuna

```
3000 CLS
3005 FOR D=1 TO 750:NEXT D
3010 PRINT @203, "LA CUNA."
3025 FOR D=1 TO 1500:NEXT D
3110 G$="T3O3L4CO2AL4.FL8C;FCFAL
4AG;B-GL4EL8C;ECEGL4GF;O3CO2AL4.
FL8C;FCFAL4AG;B-GL4EL8C;ECEGL4GL
8FC;"
3111 PLAY G$
3120 H$="FAFCFAFC;FCFAL4AL8GC;EG
ECEGEC;ECEGL4GL8FC;FAFCFAFC;FCFA
L4AL8GC;EGECEGEC;ECEGL4GF;"
3121 PLAY H$
3130 PLAY G$
3140 PLAY H$
```

### La Camila

```
4000 CLS
4005 FOR D=1 TO 750:NEXT D
4010 PRINT @202, "LA CAMILA."
4025 FOR D=1 TO 1500:NEXT D
4110 I$="T4O3L2CO2B;L8AO3CO2BAL2
G;L8FAGFEGFE;DFEDL2C;O3L2CO2B;L8
AO3CO2BAL2G;L8FAGFEGFE;DFEDL2C;"
4111 PLAY I$
4120 J$="L8GECEGECE;GGAEL4GF;L8F
DO1BO2DFDO1BO2D;FFGDL4FE;L8GECEG
ECE;GGAEL4GF;L8FDO1BO2DFDO1BO2D;
FFGDL4EC;"
4121 PLAY J$
4130 PLAY I$
4140 PLAY J$
```

### El Palomo y la Paloma

```
5000 CLS
5005 FOR D=1 TO 750:NEXT D
5010 PRINT @197, "EL PALOMO Y LA
 PALOMA."
5025 FOR D=1 TO 1500:NEXT D
5110 K$="T4P4O3L4ED;L2CO2L4G;L2A
L4G;BO3L2D;P4L4FE;L2DO2L4G;L2AL4
G;O3L2.C;"
5111 PLAY K$:PLAY K$
5120 L$="P4O2L8GABO3C;L4EEE;EDC;
O2AO3L2D;P4O2L8GABO3C;L4FFF;FED;
CL2E;P4O2L8GABO3C;L4GGG;GFE;FL2A
;P4L4AA;L2GL4F;L2EL4D;L2.C;L4CP2
;"
5121 PLAY L$
5130 PLAY K$:PLAY K$
5140 PLAY L$
```

### El Jilote

```
6000 CLS
6005 FOR D=1 TO 750:NEXT D
6010 PRINT @203, "EL JILOTE."
6025 FOR D=1 TO 1500:NEXT D
6110 M$="T4O2L4A;O3CCC;CO2AA;B-O
3CC;CO2AA;O3CCC;CO2B-A;GAG;"
6111 PLAY M$:PLAY M$
6112 PLAY "FP2;"
6120 N$="L2FL4C;L2FL8FG;L4AGF;GE
E;L2B-L4G;L2B-L8B-O3C;L4DCO2B-;B
-AC;L2FL4C;L2FL8FG;L4AGF;GEE;L2B
-G;L2B-L8B-O3C;L4DCO2B-;O3L1C;"
6121 PLAY N$
6130 PLAY M$:PLAY M$
6131 PLAY "P2L4C;"
6140 PLAY N$
```

### La Raspa

```
7000 CLS
7005 FOR D=1 TO 750:NEXT D
7010 PRINT @196, "LA RASPA or LA
S INDITAS."
7025 FOR D=1 TO 1500:NEXT D
7110 O$="T3P8O2L8C;L8FCFC;L4.FL8
C;FL16GFL8EF;L4.GL8C;ECEC;L4.EL8
C;EL16FEL8DE;L2F;"
7111 PLAY O$:PLAY O$
```

```
7120 P$="L8AL16AG#L8AL16AG#;L8AO
3CO2FL16FF;L8GFED;CP8L8A;B-O3DO2
B-GAO3CO2AF;GB-EG;L4.FL8A;B-O3DO
2B-G;AO3CO2AF;GB-EG;L2F;"
7121 PLAY P$
7130 PLAY O$:PLAY O$
7140 PLAY P$
```

### *Polquita*

```
8000 CLS
8005 FOR D=1 TO 750:NEXT D
8010 PRINT @203, "POLQUITA."
8025 FOR D=1 TO 1500:NEXT D
8110 Q$="T3O2L4CL8FL16A;O3L8CCP8
L16CC;L8DCO2B-A;B-L4.G;L4CL8.EL1
6E;L8B-L4.B-L16B-B-;O3L8CO2B-AG;
L4AFP4;L4CL8.FL16A;O3L8CCP8L16CC
;L8DCO2B-A;L8B-L4.G;L4CL8.EL16G;
L8B-L8.B-L16B-B-;O3L8CO2B-AG;AFP
8O3L16CO2A;"
8111 PLAY Q$
8120 R$="L8FFFA;AGP8L16B-G;L8EEE
G;GFP8O3L16CO2A;L8FFFA;AGP8L16B-
G;L8EEEG;L2F;"
8121 PLAY R$
8130 PLAY Q$
8140 PLAY R$
8400 FOR D=1 TO 2500:NEXT D
8500 GOTO 0
```

---

**16K**
**ECB**

# The Color Conductor

## By David Schuff

Do you love computer music but hate entering long program lines? Even if you don't know much about music, you can spend a few minutes typing and add this music to your own programs. Your friends and relatives will, no doubt, be amazed at your sudden musical ability.

The following melodies were developed from sheet music and coded into PLAY statements. The run time (length of each song) is listed in the remark statements of each program. The songs are entertaining and give you something that will show off the Color Computer.

### *Gavotte* from *Gavotte & Musette*

**Listing 1:** GAVOTTE

```
10 REM * GAVOTTE - CONVERTED *
20 REM * FOR THE TRS-80 COCO *
30 REM * BY   DAVID   SCHUFF *
40 REM * RUN TIME:  1:12.89  *
50 CLS:PRINT@257,"GAVOTTE FROM G
AVOTTE & MUSETTE"
60 A1$="O3L4GL8B-A;L4B-L8GDL4AL8
F#D;L2GL4E-L8CO2A;L4O3DL8O2B-GO3
CO2AO3L4DO2L4B-L8AGO3L4GL8B-A"
70 A2$="L4B-L8GDL4AL8F#D;L4.GL8F
L8E-DCO2B-;O3AB-DE-FCD;O2L2B-"
80 A3$="O3L4DL8FE-;L4FL8DO2B-O3G
E-C;L2FL8B-AGA;B-GECB-AGA;L8B-AG
FGFEF;GEC#O2AO3GFE-F"
90 A4$="GFEDL4AA;L16AB-AB-AB-AB-
AB-AB-AB-L8A;AFGAB-AGF;EDC#DGFE-
F"
100 A5$="L2DL4DL8FE-;L4FL8DO2BO3
L4A-L8FD;L4E-L8CO2GL4O3GL8E-C;L4
DL8O2B-GO3L4GL8DB-;O3L4CO2L8AF#L
4E-CO2A"
110 A6$="O3L4DL8O2B-GO3CO2AB-G;A
DEF#GAB-G;O3E-AB-B-CAB-G;L4ADGL8
B-A"
120 A7$="O2L8B-F#GDBFGD;O3CO2DE-
FO3CO2GO3DO2G;O3E-BAGEBCO2G;O3FO
2GAO3CFCGC"
130 A8$="AEF#DB-FGD;O4CO3B-DO4CO
3B-AGF#;GDE-CO2L16B-O3CO2L8B-AG;
L2G"
140 PLAY "XA1$;XA2$;XA3$;XA4$;XA
5$;XA6$;XA7$;XA8$;"
150 END
```

### *The Yellow Rose of Texas*

**Listing 2:** TEXAS

```
10 REM * THE YELLOW  ROSE OF *
20 REM * TEXAS  -  CONVERTED *
30 REM * FOR THE TRS-80 COCO *
40 REM * BY   DAVID   SCHUFF *
50 REM * RUN TIME:  1:43.14  *
60 CLS:PRINT@261,"THE YELLOW ROS
E OF TEXAS"
70 A0$="O3T3L8GF"
80 A1$="L4EGGG;AL2GL4F;EGL4.O4CL
8D;L2.EL4E;EO3GGO4E"
90 A2$="EL2DL4C;O3L4.BO4L8CL4.DL
8E;L2.DL4O3G;EGGG;AL2GL4F"
100 A3$="L4.EL8GO4L4.CL8D;L2.EL4
O3G;GO4FFF;FEL4.DL8C;L4.CL8GL4.O
4EL8D;L2.C"
110 A4$="O3L8GF;L4EGGG;AL2GL4F;E
GO4L4.CL8D;L2.EL4O3G"
120 A5$="GO4EEE;EL2DL4C;O3BO4CDE
;L2.DO3L8GF;L4EGGG"
130 A6$="AGL4.GL8F;L4EGO4L4.CL8D
;L2.EO3L8GG;L4GO4FFF;FEL4.DL8C"
140 A7$="O4CO3L8GO4L4.EL8D;L1C;L
2.CO3L8GF"
150 A8$="L2O4CO3G;O4L2.EL4D;L1C;
C;C;L4C"
160 PLAY "XA0$;XA1$;XA2$;XA3$;XA
4$;XA5$;XA6$;XA7$;XA1$;XA2$;XA3$
;XA4$;XA5$;XA6$;XA7$;XA8$;"
```

### *Hail to the Chief*
**Listing 3:** CHIEF

```
10 REM * HAIL TO THE CHIEF - *
20 REM * CONVERTED  FOR  THE *
30 REM * TRS-80  COCO     BY *
40 REM * DAVID SCHUFF        *
50 REM * RUN TIME:  0:46.70  *
60 CLS:PRINT@264,"HAIL TO THE CH
IEF"
70 A1$="T3O3L2GL4.AL8B;O4L2CO3L4
.BL8A;L4.GL8AL4GE;L2DC"
80 A2$="GO4L4.CL8D;L2EL4.DL8C;L4
.DL8CL4.DL8E;L1D"
90 A3$=A1$
100 A4$="L2GO4L4.CO3L8B;L4ACGE;L
2GO4L4.CL8D;L2.C;L2EL4.EL8E"
110 A5$="L4.EL8EL4FE;L2DL4DE;L2D
O3G;O4EL4.EL8E;L2EL4DC"
120 A6$="L2DO3L4.GL8G;L1G;O4L2CL
4.CO3L8B;L2AO4L4CO3A;GO4CCD"
130 A7$="L2EC;O3AO4L4.CO3L8A;L4G
AL2G;GO4L4.CL8D;L2.C;C"
140 PLAY "XA1$;XA2$;XA3$;XA4$;XA
5$;XA6$;XA7$;"
150 END
```

### *Follow Me*
**Listing 4:** FOLLOWME

```
10 REM * FOLLOW ME - ADAPTED *
20 REM * FOR THE TRS-80 COCO *
30 REM * BY DAVID SCHUFF     *
40 REM * RUN TIME:  1:25.40  *
50 CLS:PRINT@268,"FOLLOW ME"
60 A1$="T3L4F#F#;L4.F#L8F#F#L4F#
L4.A;L4AL8AL4BT3L1.A;"
70 A2$="L8AL4A;L4.BL8BL4.AL8A;L4
.GL8GL4GF#;L1.E"
80 A3$="L8F#L4GL3.AO4L8EL4DO3L3.
G;L8AL4BL2A;L8AAL4F#L3.D"
90 A4$="L8DL4E;L8F#L4AL2AL8A;L4.
BL8AL4.GL8F#"
100 A5$="L1.E;L8F#L4EL3.D;L8F#L4
AL3.G"
110 A6$="L8.BO4L7E;L4.DL8DDO3L4A
L8L1G"
120 A7$="L8F#L4AL2AL8A;L4.GL8F#L
8EL4EL1.D"
130 A8$="L4AA;L4.AL8AL4BL3A;L8.A
AA"
140 A9$="L4.GL8GL4GG;L2.F#L4F#;L
4.F#L8F#L4.F#L8F#"
150 B1$="L3.AL8AL4AA;L4BBL8BAL4G
;L1AL8A"
160 B2$="L4.BL8BO4L4DL8DL8..D;O3
L2AL4A;BBBB;O3AL8..F#L8GL4A"
170 B3$="L4.BL8BL4.AL8A;L4.GL8GL
4F#F#;L4GGL4F#L8EL1A"
180 B4$="T2P5L8F#L4AL3AL4A;GF#L8
EL4EL1.D"
190 PLAY "XA1$;XA2$;XA3$;XA4$;XA
5$;XA6$;XA7$;XA8$;XA9$;XB1$;XB2$
;XB3$;XA3$;XA4$;XA5$;XA6$;XA7$;X
B4$;"
```

### *Leaving on a Jet Plane*
**Listing 5:** JETPLANE

```
10 REM * LEAVING  ON  A  JET *
20 REM * PLANE - ADAPTED FOR *
30 REM * THE TRS-80 COCO  BY *
40 REM * DAVID SCHUFF        *
50 REM * RUN TIME:  2:35.73  *
60 CLS:PRINT@262,"LEAVING ON A J
ET PLANE"
70 A1$="T2L4GL8F#L4.D;L8GF#DL4GL
8F#D;L4GL8F#L4.D;L8GL4F#L8DP8GL4
A"
80 A2$="O4CO3L8BL4.GL4D;L8EEL4GA
G;O4L4CO3L8BL4.GL4D;EL8GL4..AL8G
"
90 A3$="O4L4CO3L8BL4.AL4G;O4CO3L
8BL4.AL4G;L1.AP4L8GL4A"
100 A4$="O4CO3L8BL4.GL8DD;L4EL8G
L4.AL4G;O4CO3BL8GDL4D;L8EEGL4..A
L8G"
110 A5$="O4L4CO3BAG;O4CO3BAG;L1.
A;L4O4D"
120 A6$="L2DO3L4BO4D;CO3L8BL2G;O
4L4DL8CO3L4BO4L4D;CO3L8BL2G"
130 A7$="O4L4DL8CO3L4BO4D;L8CO3L
4.BL4AG;L1.AP4O4L8DL4D"
140 A8$="L2DO3G;O4L4EL8DL4CL4.D;
P5L4DO3BO4D;CO3L8BL4GL8EL3.D;P5O
4L4D"
150 A9$="L4.CO3L8BL4AG;":B1$="L1
A;P4O4L8CL4C"
160 B2$="O3L1A;O4P8L4D;L2DD;L4GL
8F#L4EL4.D;"
170 B3$="P5L4DO3BO4D;CO3L8BL4GL8
EL2.D;P5L4O4D;L1C;O3L3BAG;L1A"
180 PLAY "XA1$;XA2$;XA3$;XA4$;XA
5$;XA6$;XA7$;XA8$;XA9$;XB1$;XA2$
;XA3$;XA4$;XA5$;XA6$;XA7$;XA8$;X
A9$;XB2$;XB3$;"
```

### *Country Roads*
**Listing 6:** COUNTRY

```
10 REM * TAKE ME HOME, COUNTRY *
20 REM * ROADS  -  ADAPTED FOR *
30 REM * THE  TRS-80  COCO  BY *
40 REM * DAVID SCHUFF          *
50 REM * RUN TIME:  1:22.24    *
60 CLS:PRINT@259,"TAKE ME HOME,
COUNTRY ROADS"
70 A1$="T3O2L8AO3L4.AL4C#;O2L8DG
#O3L4EL8BO4C#L4E;O3L8BO4C#L4EL8E
L4F#"
```

```
80 A2$="L8C#O3L4.AL4EE;L4.F#L2E;
P2L4F#L8EL4F#L2A"
90 A3$="O3P2L8BL4.B;O4C#O3L2B;L4
F#F#F#E;L8F#L4AL1A"
100 A4$="L4P2EE;L4.F#L2E;L4F#AAO
4C#;L1C#"
110 A5$="O3L4BBBB;O4L4.C#O3L2B;L
4F#AAL8BL2A"
120 A6$="O3L4AB;O4L1C#;L8C#O3BL4
A;L1B;O4L4C#O3B"
130 A7$="O3L1A;O4L4C#E;L1F#;L4F#
F#;EL2.C#"
140 A8$="L8C#O3BL4A;BO4L2.C#;L8C
#O3BL4A;L1A;L4AB"
150 A9$="L1A;P2L4AAA;L2G#L4AB"
160 B1$="O4C#C#C#C#;C#O3BL4.AL8A
;O4L4.DL8DL4DD;DC#O3BA"
170 B2$="L2BO4L4.C#L8C#;L2.O3B;L
4B;O4C#C#C#C#;O3BBL8BL4.B;L4AAL8
AL4.A"
180 B3$="AL8AAL4.A;L4BO4C#O3L1B;
L4BO4C#L1D"
190 PLAY "XA1$;XA2$;XA3$;XA4$;XA
5$;XA6$;XA7$;XA8$;XA9$;XB1$;XB2$
;XB3$;XA6$;XA7$;XA8$;O3L1A"
```

---

16K
ECB

# Up With The Beat

## By Bill Bernico

In the August '86 "Letters to the Editor" section of RAINBOW (Page 8), Michael Bridges requested a program to allow the CoCo to perform as a metronome: a clockwork device used to help maintain a regular tempo while practicing music. Granted, it's not sophisticated enough to use in a recording studio, like Mr. Bridges wanted, but it will show the ambitious programmer how to build one.

The up and down arrow keys are used to select the speed, the ENTER key is used to set the metronome in motion; to change the speed, simply press S. As you select a speed, notice the numeric speed value in the upper left-hand corner of the screen. It changes with each arrow keystroke. Make a note of the number and it will help you find an appropriate speed the next time you run the program.

The commas in the listing are place holders for the graphics characters that are not being used in the display. Be sure to put them in the correct place when typing the listing.

**The listing:** METRNOME

```
1 PMODE4,1:PCLS1:SCREEN1,1:DIMA$
(90):FORA=32TO90:READA$(A):NEXT:
DRAW"C0BM165,6":A$="METRONOME":G
OSUB18:DRAW"BM3,10":A$="SPEED":G
OSUB18:DRAW"BM3,20":A$="VALUE":G
OSUB18:LINE(0,25)-(40,35),PSET,B
:DRAW"BM76,11":FORX=1TO25:DRAW"R
9BD3L9BD3":NEXT
2 DRAW"BM90,17":A$="SLOWEST":GOS
UB18:DRAW"BM90,158":A$="FASTEST"
:GOSUB18:CIRCLE(198,156),3:LINE(
150,10)-(245,160),PSET,B:DRAW"BM
198,156C0M-40,-140":LINE(0,187)-
(255,177),PSET,B:DRAW"BM2,185":A
$="SELECT SPEED WITH ARROW KEYS
& <ENTER>":GOSUB18
3 DRAW"C0BM18,175":A$="HIT <S> T
O CHANGE METRONOME SPEED":GOSUB1
8
4 H=59:V=92:Y=600:G$="R9NH2NG2R
5 DRAW"C0BM=H;,=V;"+G$:DRAW"C0BM
2,33":A$=STR$(Y):GOSUB18
6 I$=INKEY$:IF I$=""THEN 6
7 IF I$=CHR$(94)THEN DRAW"C1BM=H
;,=V;"+G$:V=V-3:Y=Y+25
8 IF I$=CHR$(10)THEN DRAW"C1BM=H
;,=V;"+G$:V=V+3:Y=Y-25
9 IF I$=CHR$(13)THEN 15
10 IF V>158 THEN V=158
11 IF V<11 THEN V=11
12 IF Y>1275 THEN Y=1275
13 IF Y<50 THEN Y=50
14 LINE(1,26)-(39,34),PSET,BF:GO
TO 5
15 DRAW"C0BM198,156M-40,-140":EX
EC43345:FORX=1TOY:NEXT:DRAW"C1BM
198,156M-40,-140":DRAW"C0BM198,1
56M+40,-140":EXEC43345:FORX=1TOY
:NEXT:DRAW"C1BM198,156M+40,-140
16 I$=INKEY$:IF I$=""THEN 15
17 IF I$="S"THEN DRAW"C0":CIRCLE
(198,156),3:DRAW"BM198,156M-40,-
140":GOTO5ELSE16
18 F=LEN(A$):FORE=1TOF:G=ASC(MID
$(A$,E,1)):DRAWA$(G)+"BR3":NEXTE
:RETURN
19 DATABR2,,,,,,BR5BU2G2LHE3UHLG
DF4,,,,,,,,,,BRHU4ERFD4GNLBR2,R2
U6NGD6R2,BU5ER2FDGL2GD2R4,BU5ER2
FDGNLFDGL2NHBR3,BR3U6G3R4BD3,BUF
R2EU2HL3U2R4BD6,BU3R3FDGL2HU4ER2
BD6BR,BU6R4DG3D2BR3,BRHUER2EUHL2
GDFR2FDGNL2BR,BRR2EU4HL2GDFR3BD3
,,BR4BU6G3F3,,E3H3BR4BD6
20 DATA,,,U5ER2FD2NL4D3,,BR4BU5H
L2GD4FR2EBD,RU6NLR2FD4GNL2BR,U6N
R4D3NR3D3R4
21 DATAU3NR3U3R4BD6,BUU4ER3BD4NL
D2L3NHR3,U3NU3R4U3D6,R2U6NL2NR2D
6R2,,U3NU3RNE3F3,NU6R4,U6F2DUE2D
6,U6F4NU4D2,BRHU4ER2FD4GNL2BR,U6
R3FDGL3D3BR4,,U6R3FDGL3RF3,BUFR2
EUHL2HUER2FBD5,BU6R4L2D6BR2,BUNU
5FR2ENU5BD,BU6D4F2E2U4BD6,NU6E2U
DF2NU6,,BU6DF2E2NUG2D3,
```

16K
ECB

# Sound Off

## By Gip W. Plaster, II

One of the most interesting aspects of the Color Computer is its ability to produce sounds. The following program combines `FOR-NEXT` loops and short `PLAY` statements to produce two minutes and 45 seconds of music and sound effects on the CoCo.

**The listing:** `SOUNDOFF`

```
10 CLS
20 PRINT@128,STRING$(32,"*");
30 PRINT@288,STRING$(32,"*");
40 PRINT@194,"EXPLORERS--BY GIP
W. PLASTER";
50 FORX=1TO500:NEXTX
60 PRINT@421,"T H E Y ' R E    O
 F F";
70 FORN=1TO2
80 PLAY"O1;T5;L16;DCDCDCDCDCDCDC
DCDCDCDCDCDCDCDCDCDC;L8;DCDCDCDC
DCDCDCDCDC;L4;DCDCDCDCDCDCDCDCDC
DC;L2;DCDCDC;L1;DCDCDC;T1;V15;D;
V10;C;V14;DC"
90 FORM=1TO2
100 FORL=1TO2
110 PRINT@420,"ORBITING   EARTH.
.."
120 PLAY"V15;O1;T5;L8;CDEFGABAGF
EDCDEFGABGFE"
130 NEXTL
140 FORJ=2TO100STEP5
150 PRINT@420,"WHAT  WAS  THAT ?
??";
160 FORI=255TO1STEP-1
170 POKE140,I:EXEC43345:NEXTI
180 NEXTM
190 IFN=1THEN200ELSE220
200 PLAY"O1;T1;L1;DC"
210 PRINT@416
220 NEXTN
230 FORP=1TO5
240 FORI=255TO200STEP-1
250 POKE140,I:EXEC43345:NEXTI
260 NEXTP
270 FORI=255TO1STEP-1
280 POKE140,I:EXEC43345:NEXTI
290 PRINT@420,"WE  MADE  IT !!!!
!!!!!!!";
300 PLAY"O1;T1;CDEFGABABABABABBB
AB"
310 FORI=255TO1STEP-1
320 POKE140,I:EXEC43345:NEXTI
```

*Hint . . .*

## Arrow-Minded

Many requests have come my way for a keyboard revision to my program, *Discrimination* (January 1987, Page 52). After changing/adding the following lines to the program, you will be able to use the arrow keys for movement instead of the joystick. Instead of the firebutton, press the space bar.

```
2110 IFQ$="Q"THENRETURNELSEPOKE1
78,C:DRAW"BM=X;,=Y;R20D20L20U20"
:IFQ$=CHR$(8)THENX=X-88/LD ELSEI
FQ$=CHR$(9)THENX=X+88/LD ELSEIFQ
$="^"THENY=Y-22 ELSEIFQ$=CHR$(10
)THENY=Y+22
2112 MX=(LD*2-1)*88/LD+5:IFX<5TH
ENX=5ELSEIFX>MX THENX=MX
2113 IFY<104-D THENY=104-D ELSEI
FY>170-D THENY=170-D
2115 P=(X-5+(Y+D-104)*8)/(88/LD)
:P=INT(P+.5)
2120 IFQ$=" "THENZ=1ELSEIFZ THEN
Z=0:RETURN
```

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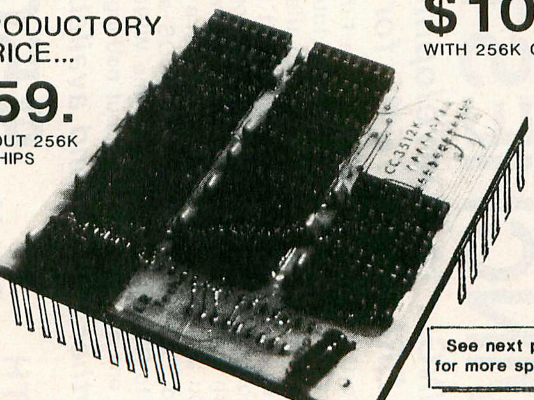

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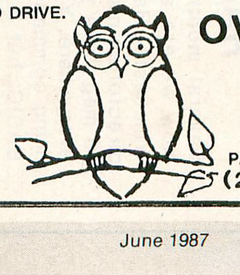

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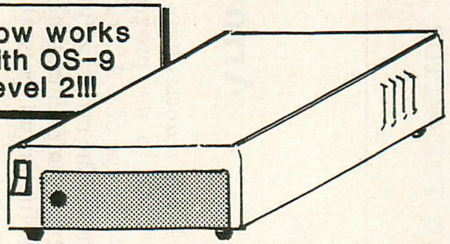

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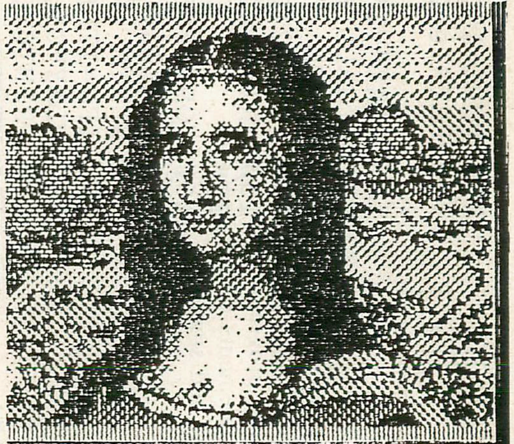

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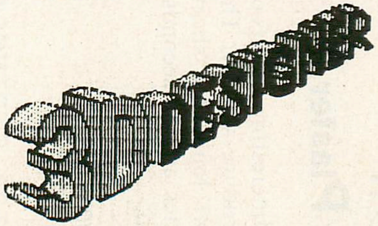

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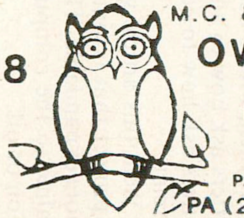

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# An Expandable Relay Project

By Tony DiStefano
Rainbow Contributing Editor

About two years ago, I wrote an article called "Lights, Camera, CoCo!" [Dec. '84]. It describes how to hook up as many as eight lights to the CoCo and have the computer control the on and off of each light. Ever since then, I have been getting letters about it. Some of the letters ask how to add more lights to the system, and other letters ask how to connect relays and other devices to the circuit.

Well, this article will answer a whole lot of letters with a project that is similar to "Lights, Camera, CoCo!," but more expandable. The idea is to be able to put many relays online to the computer and to be able to tell if the relay is on or off.

The heart of the circuit is a TTL (Transistor-Transistor-Logic) logic gate. I have talked about and used TTL logic gates ever since I began writing articles, so they should not be new to you. I have also used this particular chip many times before. The chip is a 74LS138. Ah yes, the good ol' 138. It is a decoder — a three-input to eight-output decoder, with three control lines. Remember binary counting? If we have a three-bit number, it represents eight separate digits, 0 to 7. If we connect these three input bits to the lower three address lines of the CPU, then the CPU can access eight address locations.

Study the pinout of the 74LS138 in Figure 1. Notice that the three inputs are connected to three address lines of the CPU. That determines the eight address locations to be used. The CPU in the CoCo is an MC6809 and is capable of accessing 64K locations of memory. We only want eight. We can decode the other address lines to map only the eight locations we need, or we can use the already-decoded location in the computer.

This decoding is done in the SAM chip inside the CoCo. The pin that does this decoding is labeled "SCS" and is an active low output. That means the pin is normally high and, when accessed, will go low. In this case, the pin will go low when the CPU accesses memory locations $FF40 to $FF5F (65344 to 65375 in decimal). This represents a memory area of 32 bytes. If you have a disk drive system, it is reserved for I/O to the hardware of the drive. More on this later. We use this pin to activate the 74LS138. Since we only need eight of the 32 locations, the other locations will become mirror images of these eight locations and should not be used.

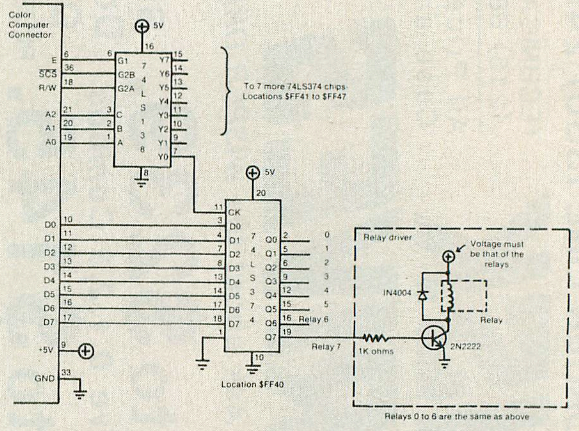

Figure 1

The next connection we make is the R/W line. This output line comes from the CPU and tells the hardware whether the CPU is reading or writing. In this case, the pin is high to read and low to write. Since our circuit controls relays, the CPU need only be able to write. The last line on the input side of the 74LS138 is connected to the E clock of the CPU. The E clock is a signal generated by the CPU to be used by hardware as a timing signal indicating when the data is valid on a read or a write. The other eight pins on this chip are outputs. Each of these output lines represents one memory location and can control one device.

---

*Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.*

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Having eight locations means that you can control eight devices.

The 74LS138 chip is used to decode eight memory locations. Relax; we are getting closer to the relays. Now, the data that goes around on the data bus is always changing. The CPU is always busy. We need a component that will hold the data we write to these locations and remember it. This kind of part is called a latch. The one I will use is a 74LS374. It is an eight-bit latch.

Examine the 74LS374 in Figure 1. It has eight input bits that are connected to the CPU data bus. It also has eight output bits. These bits hold the value that is put into it when the CPU writes to that location. The location is controlled by the 74LS138. Each of these 374s has eight bits. Each of these bits can control one device. For instance, a relay is one device. However, the output of the 374 is not strong enough to turn on a relay by itself. A driver is needed. A one-stage transistor will do in most cases. In the diagram, only one circuit is shown, but it is to be repeated for every relay to be used.

Finally, we get to the relays! The relay you use depends on your needs. If you use the relay for very small current applications, then a relay such as the Radio Shack No. 275-243 will do. It will switch 2 amps and works directly off of 5 volts. If you need a higher capacity relay you must figure out the details by yourself.

The transistor used in this circuit can handle about 30 volts and can sink about 200 mA. Overdriving the transistor may damage it due to overheating. One 374 can control eight transistors and eight relays. If you need more than eight relays you must use another 74LS374. This will allow

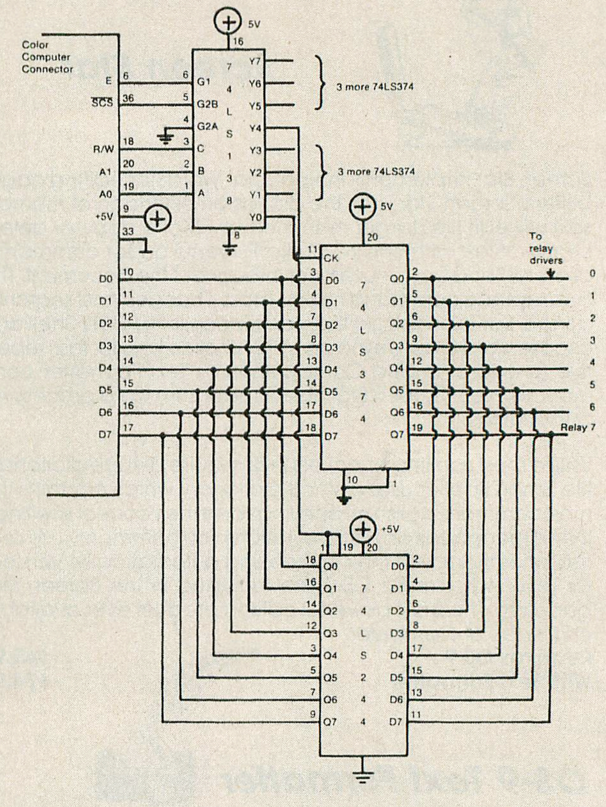

Figure 2

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you to connect eight more relays and, for every 374 you add, another eight relays can be controlled. When I tried this circuit, I used three 74LS374s but only eight relays. Theoretically, you can connect up to 64 relays with this circuit, but I am sure you would run into power supply problems. You will have to drive the relays with a separate power supply.

So far, you can just write to the address locations that control relays. The only way the software can find out which relay is on is by keeping track of what value you stored in that location. But, with a little more hardware, you can read the memory locations and find out exactly which relay is on and which relay is off. The only drawback to this is that it limits the number of relays you can control to 32 instead of the 64 write-only relays. The choice is yours to make.

Figure 2 shows how to make a relay system that allows you to read the location as well as write to it. You will first notice the changes to the 74LS138. The A2 line is removed and replaced with the read/write line. This divides the eight output lines of the 138 to four read lines and four write lines. The four write lines connect to our transistor and relay system just like before. But now we have four read lines. We will need a different chip in order to read the output of the 374s. There are many chips you can use; I chose the 74LS244. It is an eight-bit buffer with tri-state. The inputs of the chip are connected to the outputs of the 374s. This way, the CPU can see right away, by accessing a read to the particular location, which relay is on or off by seeing which bit is high or low. The outputs of the 244s are connected to the CPU data bus. When the chip is selected (by a read), the data that is on the input appears to the CPU. It is as simple as that.

Now for the software. As I said before, we are using the SCS signal from the SAM chip. This signal-maps our relays from $FF40 to $FF5F. If you are using the circuit in Figure 1, then the following structure is used:

| Memory Location | Write Only to Relays |
|---|---|
| $FF40 | Relay 0 to 7 |
| $FF41 | Relay 8 to 15 |
| $FF42 | Relay 16 to 23 |
| $FF43 | Relay 24 to 31 |
| $FF44 | Relay 32 to 39 |
| $FF45 | Relay 40 to 47 |
| $FF46 | Relay 48 to 55 |
| $FF47 | Relay 56 to 63 |

These relays are always least significant bit first. For example, relays 0 and 8 are on Data Bit D0 and relays 1 and 9 are on Data Bit D1.

If you wired up the circuit in Figure 2, then it should look like this:

| Memory Location | Read/Write to Relays |
|---|---|
| $FF40 | Relay 0 to 7 |
| $FF41 | Relay 8 to 15 |
| $FF42 | Relay 16 to 23 |
| $FF43 | Relay 24 to 32 |

The memory locations from $FF44 to $FF47 are the same as locations from $FF40 to $FF43, respectively.

Reading the locations $FF40 to $FF47 in Figure 1 is allowed, but the values you get will not be valid. To turn one relay on or off you must store (`POKE` command in BASIC) a value into one of the locations. What value you use depends on where the relay is. If you want to turn on Relay 0, then you must store a value of 1 in that location. If, for example, you also want Relay 3 on, you must add the value of 8 to your previous value. Each bit value has a numeric value. Remember the binary counting system; I told you it would come up over and over again. I hope by now you understand what binary is all about. Anyway, the values associcated with each bit go like this:

| Bit Number | Decimal Value | Hex Value |
|---|---|---|
| D0 | 1 | 1 |
| D1 | 2 | 2 |
| D2 | 4 | 4 |
| D3 | 8 | 8 |
| D4 | 16 | 10 |
| D5 | 32 | 20 |
| D6 | 64 | 40 |
| D7 | 128 | 80 |

The last thing I must talk about is the Multi-Pak Interface. If you are using a Radio Shack Multi-Pak Interface and a floppy disk controller, there is some switching you must do first. The Multi-Pak has four slots. Each of these slots has two memory-mapping pins. The first is called the CTS pin. It is used to map up to 16K of memory area. The software for the disk drives called DOS usually resides there.

The second is the SCS pin we are using. The Multi-Pak has the capability of switching these signals to one of the four slots. It also has the capability of switching them separately. I mentioned earlier the hardware that controls the disk drives uses this pin. It uses the SCS in the slot the controller is in. If you want to use the relay complex with the Multi-Pak and a disk drive controller, you will have to do some switching before you use the relays. After you are finished, switch back to the original slot. Place the disk controller in Slot 4 and the relay complex in Slot 1. When you want to use the relay complex you must first do the command `POKE &HFF7F,&H30`.

When you are finished and want to use the drive again, you must do the command `POKE &HFF7F,&H33`.

## Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submissions Editor, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

# SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

## FEEDBACK

In response to letters from:

- Tom Rawlinson: In *Vortex Factor*, you need to make a candle at London 1200. With the string in your possession, type `MELT BIRD,MAKE CANDLE`. Open the sarcophagus and type `GIVE RING`. After you go through the secret passage, type `LOOK SARC`.

- Steve Adler and Bobby Limoges: When in the cell in *Vortex Factor*, type `LOOK SKELETON` three times. Be sure you have the hacksaw when you enter the cell; type `SAW WIND` and `GO WIND`.

I cannot find all of the treasures. I am told there is a ruby necklace and a diamond, but I cannot find these.

- Eric Tabor: To open the safe in *Vortex Factor*, you must turn the dial. The game will ask you what the combination is.

- Mark Reiter: In *Dallas Quest*, look at the parrot. He will help you.

- Scott Nagel: When you're in the dispensary in *Bedlam* and you have the hook, type `GET RED KEY WITH HOOK`. In the room west of the Electro-Shock therapy room, type `GET GREEN KEY WITH HOOK`.

- Gregg Thompson: In *Dallas Quest*, go south when you get out of the tree. The path is always north to south.

- Jason Mulig: Wave the ring to get past the cannibals and to get into the cave in *Dallas Quest*.

- Omri Goren: When in the pool in *Sands of Egypt*, type `HOOK SCEP`. Then, type `PULL SCEP` and `UNHO SCEP`. Be sure to get the scepter; you will need it again.

- Phil Derkson: After returning the scepter in *Sands of Egypt*, type `GO CRAC`. Don't try to get the treasures. Get the ladder, type `GO ARCH`. Then `UNTIE ROPE`, type `LOOK` and let the boat drift until you see a hole in the roof. Drop and climb the ladder.

- John Wood: In *Sands of Egypt*, the oil is where the snake was killed.

- Serge Grenier: In *Martian Crypt*, you must type `PRY PLAQUE`. Then type `USE STALACTITE`.

- Jerry Honigman: In *Black Sanctum*, the wood you need is from the boarded up door.

- Edward Swatek: In *Trekboer*, you must have the amulet in your possession to go through the force field. To get the grate, follow the same process you used to open the white panel.

- Dean Muller and Joel DeYoung: In *Calixto Island*, you need to take the tire pump with you when you go to the island.

- Andy Thornton: In *Dallas Quest*, type `GIVE EGGS`. Then type `GIVE MIRR`.

In *Hitchiker's Guide to the Galaxy*, what is the right phrase combination to keep from getting killed by the flying brick?

*Ray Knoch*
*Lawson, MO*

- Larry Lockwood: You can't take the scroll the wizard's image lays in *Dungeons of Daggorath*. After the image is destroyed, you are immediately sent to the fourth level.

- Chris Ravenell: There are two ways to get away from the blob in *Dungeons of Daggorath*. The first is to run away and the second is to climb up or down a ladder. To destroy the blob, hold the sword in your right hand and attack from the right. When the blob is directly in front of you, press ENTER, M and press ENTER again. This will damage it and take you out of danger. Type `AR`. When the blob is in front of you, repeat the previous step. Blobs can be destroyed by a single hit later in the game.

- Philip Manwarren: In *Raaku-Tu*, there is only one way to kill the gargoyle. You must get the candle and the lamp, then enter the chamber with the gargoyle and bring it to life. Light the candle with the lamp and drop the candle. Exit the room the same way you came in. Type `WAIT 10` times to give the candle time to kill the gargoyle. Go back into the gargoyle's chamber and extinguish the candle. Now you can enter the next room.

I am trapped in the tunnel under the altar. I have crawled to the south wall, only to be killed by the guards. Can I get out without dying?

*Tom Biggs*
*Hillsdale, NY*

- Chris O'Neal: In *Sands of Egypt*, the scepter is found after you ride the camel. Type `EXAMINE CARVING` and then type `EXAMINE`. You must then use the oil.

To get off the boat once you have typed `DROP LADDER`, just type `CLIMB LADDER` and ride the camel again for a surprise.

- Luis Torres: In *Sands of Egypt*, you must get the canteen. The canteen can be located by going east three times from the snake. Next, go to the oasis. Type `CLIMB STEPS` and then fill the canteen.

*Karl Beyer*
*Marengo, IL*

- Alex Abraham: Use graph paper to map your steps through *Wizard's Castle*. Remember to use the command `SWIM` at the river, and when you reach the cavern, do what the `HELP` statement is answered with.

How do I get the gold bar in *Gold Runner 2*'s second level — the one at the top under the blue bricks?

*John Beck*
*Suitland, MD*

- Barbara Williams: Before digging down to collect the piece of gold in *Gold Runner*, make sure you have all the gold. The ladder will appear from the top of the screen down through the rock so you can get to it.

In *Pyramid*, water the bean plant twice, so it will reach the hole. How do you get to the maze?

*Justin Wyss*
*Warrington, PA*

- Quinn Granfor: In Chamber 8 in *Downland*, in order to get to the second vertical rope from the horizontal rope, go *all* the way up the first rope and hold the joystick to the right. You will slide down onto the rope. When you reach the other side you should have no problem.

In Chamber 9, be careful on the third vertical rope at the top. A drop will cause you to fall off the rope.

*Duane Whitlock*
*North East, MD*

- Rodrigo Maldonado: When you kill the snake go east twice in *Sands of Egypt*, then get the container. You need the oil to get the scepter.

- David Boyd: In *Sands of Egypt*, go to the hole in the roof and go up.

- Jeff Haase: All you need is a magnifying glass, shovel, canteen, snake oil, torch, dates and rope in *Sands of Egypt*.

- David Hunt: When in the mine in *Dragon Blade*, all you need is the sword. When at the sword room go up.

I need to know how to solve *The Interbank Incident* — I solved it once, but forget how I did it.

*Don Grey*
*Austell, GA*

### Something Fishy

*Scoreboard:*

Here are some hints on *Hitchhiker's Guide to the Galaxy*: To get the babel fish, put the gown on the hook, get the towel (from Ford), put the towel on the drain, get the satchel, cover the panel with the satchel, put the junk mail on the satchel and press the dispenser button.

How do you steal the Heart of Gold? I've gotten the guards to drop their rifles, but I cannot get to the ship without being shot. What do you say to Prosser to make him lie in front of the bulldozer?

*Chuck Poynter, Jr.*
*Hector, AR*

### The French Connection

*Scoreboard:*

In *Hitchhiker's Guide to the Galaxy*, on Damogran, steer toward France. There is fluff and the key to the toolbox. On the dais, tell the guards to drop their rifles.

*Marc Prudhommeaux*
*Winter Harbor, ME*

### Time Travel

*Scoreboard:*

I can't get past the screening door in *Hitchhiker's Guide to the Galaxy*, but I figured out how to travel in time. To build the time machine, connect the small plug on the spare improbability drive to the small receptacle on the vector plotter. Then put the long dangly bit in the tea substitute and flip the switch.

*Steven Smashnuk*
*Dawson Creek, British Columbia*

### No Shoes Like Snowshoes

*Scoreboard:*

In *Omniverse*, I found the flute and gave it to the eskimo, and he gave me a vial of magic dust. What is the dust used for? I cannot climb the cliffs or get out of the pits because I have no snowshoes. Where do you get the snowshoes?

In *Hitchhiker's Guide to the Galaxy*, I can't get the plotter. I typed the first word of the second verse of the poetry but nothing happens.

*Dale Kaczmarek*
*Oaklawn, IL*

### Block Talk

*Scoreboard:*

I would like to know how to remove the block in *Pyramid*.

*Chris Norman*
*Liberty, PA*

### Can't Be Beat

*Scoreboard:*

In *Knock Out*, I can't beat the Knock Out Kid. In *Sands of Egypt*, I can't get into the Pyramid. In *Raaku-Tu*, how do you get past the gargoyle and over the rug to the door on the other side?

*Derek Myall*
*Charlotte, MI*

### Gargoyle Repelent

*Scoreboard:*

How do I get past the gargoyle in *Raaku-Tu*? I tried hitting it with everything I could find, but nothing works.

If the candle is lit, the gargoyle will not attack. The only problem is that after three entries, the burning candle will cause you to pass out, ending the game.

*Mike Mumper, Jr.*
*Loysville, PA*

### Frond or Foe?

*Scoreboard:*

In *Sands of Egypt*, where is the canteen? How do I get back from the pyramid to the pool? After you drain the pool, what will happen? Are the palm fronds useful?

*George Lane*
*Chicago, IL*

### Giddyup Camel, I Want To RIDE

*Scoreboard:*

In *Sands of Egypt*, I can't go anywhere besides the pool and the cliff. Is there a way to ride the camel that is at the pool, can you drain the pool, and by what command? What is the snake oil used for?

*Neil Abdollahian*
*Akron, OH*

### Desert Necessities

*Scoreboard:*

In *Sands of Egypt*, I have the canteen, the torch, the shovel and the magnifier. What else do I need to get to the pyramid?

*Mike Duvall*
*Zanesville, OH*

### Deperately Seeking Scepter

*Scoreboard:*

I cannot get the scepter in *Sands of Egypt*. Also on Naurius, where is the wizard's stick and how do you cross the pit?

*Duckie*
*Vallejo, CA*

### Cannibal Clue

*Scoreboard:*

In *Sands of Egypt*, to drink the water, fill the canteen and drink. To ride the camel, feed the camel the dates and mount and ride the camel. Then, dismount and examine the carving.

To get out of the jungle in *Dallas Quest*, go south. To get past the cannibals type `WAVE RING`. To find the eggs, take the road to the vulture at the crossroads.

*Philip Manwarren*
*Harrington, ME*

**To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will immediately forward your letter to the original respondent and, just as importantly, we'll share your reply with all "Scoreboard" readers in an upcoming issue.**

**For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.**

**— Jody Doyle**

# The Inadvertent Inverse Video

### By Richard E. Esposito Rainbow Contributing Editor with Richard W. Libra

*When using* Stylograph *Version 3.1.2 on my CoCo 3 with OS-9 Level II, pressing the* CTRL-BREAK *keys to change back to command mode switches the screen display to inverse video. Is there a fix?*

*Marta Roman*
*St. Petersburg, FL*

℞ Using Debug on your Level I system, change, at offset $109F, the value from $A0 to $A1, then save and verify U. If you want to change any parameters, e.g., maximum number of parameters, default memory size, etc., run `styfix` because this version of `styfix` (designed for Level I) will not work with Level II. Great Plains Software promises a true CoCo 3 version of Stylo, possibly by the time you see this in print.

## CoCo 3 3½-inch Drives

*What is your opinion on using 3½-inch drives on a CoCo 3 with OS-9 level II?*

*Susan Emery*
*Glen Ellen, IL*

℞ While the 80-track, double-sided drives in either size (3½-inch or 5¼-inch) are electrically equivalent and hold the same amount of data, OS-9 Level II was obviously designed to be used with the 80-track, 5¼-inch drives such as the TEAC 55F. This new release automatically "double steps" 40- or 35-track disks with these drives, giving you the ability to read 40- or 35-track disks without the need to insert them in one of those lower-capacity drives. If you have a 40-track DSDD drive as /d2 and 80 trackers in /d0 and /d1, you can copy files from *any* 5¼-inch OS-9 disk (regardless of format) to the 40- or 35-track disk in /d2. With a 3½-inch drive, you lose this flexibility and you pay more for the "privilege" (both drives and disks cost more in the 3½-inch variety).

You can make an 80-track, bootable Drive 0 even though Tandy omitted the 80-track descriptor for /dd and /d0. Although there are more elegant ways to do this, here's one way (assuming two 80-track drives in 0 and 1, 35/40 track in 2). Copy your Radio Shack OS-9 Level II system disk to Drive 0 from Drive 2 using BASIC's `DSKINI0` and `BACKUP2TO0` commands giving you a pseudo 80-track system disk. Drop power, then boot up by typing `DOS` with the pseudo 80-track system disk in Drive 0. After typing the date, type the following:

```
MODPATCH -S
L D0
C 16 1 3
C 18 23 50
C 19 1 2
V
L DD
C 16 1 3
C 18 23 50
C 19 1 2
V
L D1
C 16 1 3
C 18 23 50
C 19 1 2
V
```

Press CTRL-BREAK.

Now put the original 35-track system disk in Drive 0 and type the following:

```
chx /d0/cmds
format /d1
cobbler /d1
makdir /d1/cmds
copy /d0/startup /d1/startup
copy /d0/cmds/shell /d1/cmds/
shell
copy /d0/cmds/date /d1/cmds/
date
copy /d0/cmds/setime /d1/
cmds/setime
copy /d0/cmds/link /d1/cmds/
link
```

You now have an 80-track, double-sided, quad-density bootable system disk in Drive 1. Test it and, upon verification that it does boot, discard the pseudo 80-track disk. Once you boot with the new system disk, you can read 35-, 40-, or 80-track, single- or double-sided disks with your 80-track drives.

---

*Richard Esposito is a senior project engineer with Northrop Corp. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.*

*Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.*

Note 1: By adding a few commands to the `Modpatch` procedure above, you could also change the step rate of your drives from 30 ms to a faster 20 ms, 12 ms or 6 ms by changing the value at offset 14 to 1, 2 or 3, respectively

Note 2: If you have K. Darling's `dmode` from Delphi or a Level II version of `save`, this procedure can be greatly simplified. You could add the missing descriptors to the `MODULES` directory and build the system directly with `config`.

### An Old Disk Controller

*The Disk* BASIC *1.0 Radio Shack Disk Controller worked fine on my gray 16K ECB CoCo 2* BASIC *1.0. I recently bought a white 64K CoCo 2* BASIC *1.1, but my disk system refuses to operate properly with it; I always get an I/O Error. When I examine the disk status byte (DCSTA), it seems that the malfunction occurs because the drive is not ready. Could you give me any medicine to make it work again?*

*Wim Vandekerckhove*
*GeWiMa CoCo Club*
*Belgium*

℞ The disk controller shipped with the original CoCo drives (the TEC unit in a gray case) required a 12-volt power supply from the CoCo to operate. Neither the CoCo 2 or 3 have this source available on their cartridge connector. While there are ways to modify them to operate with the old controller (e.g., adding 12 volts to the connector by kludging the existing power supply or running a 12-volt line from the disk controller's power supply), the simplest method is to use a Multi-Pak Interface, which (besides allowing system expansion) provides the needed 12 volts.

### *Telewriter 64* and a RAM Disk

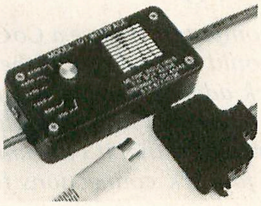
*Can I use a RAM disk on a CoCo 3 with* Telewriter 64?

*Joe Mulholland*
*Houston, TX*

℞ Jesse W. Jackson of J&R electronics offers the following to allow you to do it with his *JRAMRDSK* software. The `UNDO3.BAS` may also allow you to use some of your CoCo 2 software that otherwise would not run on the 3. On a backup of your *TW64* disk, add `UNDO3.BAS`; replace `S.XXX` with the one you see here; add `JRAMRDSK.BIN` (sold by J&R). To use *TW64* type, `RUN "UNDO3"; RUN"U"`.

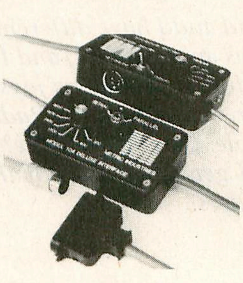
```
10 WIDTH32
20 'UNDO/BAS V1.0
30 'THIS PROGRAM WILL UNDO THE B
ASIC ENHANCEMENTS "
40 ' IN A COC3 TO MAKE IT COMPAT
IBLE WITH COCO1/2."
50 CLEAR 200,&H7DFF
60 CLS
70 PRINT" "STRING$(30,"*")
80 PRINT" *            UNDO3/BAS
    *"
90 PRINT" *
    *"
```

**Model 101 Interface $39.95**



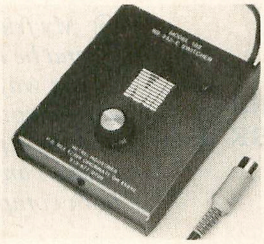
- Serial to parallel interface
- Works with any COCO
- Compatible with "Centronics" parallel input printers
- 6 switch selectable baud rates 300-600-1200-2400-4800-9600
- Small size 4" x 2" x 1"
- Comes complete with cables to connect to your computer and printer

**Model 104 Deluxe Interface $51.95**



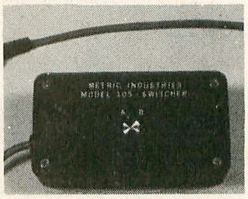
Same features as 101 plus
- Built in serial port for your modem or other serial device
- Switch between parallel output and serial output
- Size is 4.5" x 2.5" x 1.25"
- Comes complete with cables to connect to your computer and printer

**Model 102 Switcher $35.95**



- Connect to your COCO serial port and have 3 switch selectable serial ports
- Color coded indicator lights show switch position
- Lights also serve as a *power on* indicator for your COCO
- Heavy guage blue anodized aluminum cabinet with non-slip rubber feet

**Model 105 Switcher $14.95**



- Connects to your COCO to give you 2 switch selectable serial ports
- 3 foot cable to connect to your COCO's serial port
- The perfect item to use to connect a printer and a modem to your COCO
- Small in size, only 4.5 x 2.5 x 1.25

**Cassette Label Program $6.95**

- New Version - tape transferrable to disk - save and load labels from tape to disk
- Prints 5 lines of information on pin-feed cassette labels
- Menu driven, easy to use
- Standard, expanded and condensed characters
- Each line of text automatically centered.
- Label display on CRT, enabling editing before printing
- Program comes on tape and is supplied with 24 labels to get you started
- 16K ECB required

**Other Quality Items**

High quality 5 screw shell C-10 cassette tapes. **$7.50/dozen**

Hard plastic storage boxes for cassette tapes. **$2.50/dozen**

Pin-Feed Cassette Labels White **$3.00/100** Colors **$3.60/100** (specify red, blue, yellow, tan)

**NEW! Cables for your COCO**

- U.L. listed foil-shielded cable
- 2 Types: male/female extension cables (used between a serial device and existing cable) male/male cables (used between two serial devices such as a modem and one of our switchers).
- 3 ft./$3.95, 6 ft./$4.49, 10 ft./$5.59 Specify M/M or M/F and length.

The 101 and 104 require power to operate. Most printers can supply power to your interface. (Star, Radio Shack and Okidata are just a few that do - Epson and Seikosha do not). The interfaces can also be powered by an AC adaptor; Radio Shack model 273-1431 plugs into all models. If you require a power supply, add a "P" to the model number and add $5.00 to the price. (Model 101P $44.95, Model 104P $56.95).

The Model 101, 102, 104 and 105 work with any COCO, any level basic and any memory size. These products are covered by a **1 year warranty.**

The Model 101 and 104 work with any standard parallel input printer including Gemini, Epson, Radio Shack, Okidata, C. Itoh, Seikosha, Panasonic and many others. They support BASIC print commands, word processors and graphic commands.

**We manufacture these products - dealer inquiries are invited.**

**Ordering Information**

Free shipping in the United States (except Alaska and Hawaii) on all orders over $50.00. Please add $2.50 for shipping and handling on orders under $50.00.
Ohio residents add 5.5% sales tax.
Call (513) 677-0796 and use your VISA or MASTERCARD or request C.O.D. (Please add $2.00 for C.O.D. orders).
If you prefer, send check or money order; payable in U.S. Funds to:

**Metric Industries**
**P.O. Box 42396**
**Cincinnati, Ohio**
**45242**

```
100 PRINT" *
     *"
110 PRINT" *      J & R ELECTRONI
CS     *"
120 PRINT" *           (C) 1987
     *"
130 PRINT" *      BY J.W.JACKSON
     *"
140 PRINT" *   ALL RIGHTS RESERV
ED     *"
150 PRINT" "STRING$(30,"*")
160 PRINT"POKEING PROGRAM INTO M
EMORY .";
170 FOR I=&H7E00 TO &H7E24
180 READ X$
190 PRINT".";
200 POKE I,VAL("&H"+X$)
210 NEXT I
220 PRINT:INPUT "PRESS A KEY TO
EXEC PROGRAM";ZZ$
230 EXEC &H7E00
240 DATA 1A,50,8E,80,00,86,84,B7
250 DATA FF,90,B7,FF,DE,EC,84,B7
260 DATA FF,DF,ED,81,8C,FE,00,26
270 DATA F1,86,0F,B7,A0,55,0F,71
280 DATA 0F,72,7E,A0,27,FF,FF,FF
```

---

```
10 'S.XXX V3.0 ****************
20 ' REPLACES TELEWRITER-64 2.0
30 ' FILE NAMED S.XXX FOR USING
40 ' RAM DISK WITH TELEWRITER.
50 '***************************
60 CLEAR 700,&H6FEF
70 REM MENU
80 CLS
90 PRINT:PRINT MENU SELECTIONS
100 PRINT" <R> = LOAD RAM DISK P
ROGRAM "
110 " <B> = BINARY DISK I/O
  "
120 PRINT" <A> = ASCII DISK I/O
       "
130 PRINT:PRINT"PRESS A KEY ....
 ";
140 MS$=INKEY$:IF MS$="" THEN 14
0 ELSE PRINT MS$
150 IF MS$="B" THEN 190
160 IF MS$="A" THEN 200 ' ASCII
I/0
170 IF MS$="R" THEN GOSUB 210' R
AM DISK
180 GOTO80'********************
190 LOAD"S/BIN",R
200 LOAD"S/ASC",R
210 LOADM"JRAMRDSK"
220 POKE &H6FF3,&H98:POKE &H6FF4
,&H00' PDEST TO &H9800
230 POKE &H6FF7,&HFF:POKE &H6FF8
,&HFF' DISABLE RESET PROTECT
240 EXEC:RETURN
250 END' S.XXX *****************
```

### Artifact Color Distortion

*I have an old gray CoCo 1, Color BASIC 1.1, Extended BASIC 1.0, upgraded to 64K and an NC board. Everything seems to work fine, except when a program with artifact colors is run, some of the colors come out wrong. For example, one program with flags shows an American flag with green stripes instead of red. Some other colors are off, too. Is there a fix for this problem, or is it something I just have to live with?*

*Merlin Hansen*
*Nampa, ID*

℞ There are two common causes of the problem you mention. Ed Ellers suggests that the master clock trimmer capacitor may be misadjusted. I'm not sure how it's labeled in the NC board you have, but it should be somewhere near the SAM chip. First, adjust your TV set for proper color on a broadcast TV signal (if you can get a color bar test pattern, adjust the tint control so that the third bar from the left is light blue and the fifth bar looks purplish—not reddish), then hook up the CoCo and adjust the trimmer to obtain the proper colors.

In some TV sets, it is possible for the "chroma demodulator" stages to become misaligned, causing incorrect colors on the screen. If you can't get red and blue at the same time at any setting of the tint control, you may need to have the TV checked out by a technician.

One other thing to check is the automatic tint control switch (labeled AUTO/AFT, A/T, ACM, Color Sentry or one of many other names). This should be switched off for proper color rendition when using the CoCo.

### CoCo Joystick for an Apple

*My friend and I have different computers (I have a CoCo and he has an Apple IIc) and I would like to know if there is a way for us to make a joystick adapter for the Apple. The adapter would fit on a Radio Shack joystick and plug into the Apple. Can this be done? Providing that it's possible, where can I get schematics of the joystick connections for both computers?*

*Dan Miller*
*Oregon, OH*

℞ It should be possible to make the CoCo-to-Apple adapter; all you need is a 6-pin DIN jack and a 9-pin D plug to fit the Apple IIe/IIc paddle connector. You will need to get the Apple pin connections from the Apple IIc manual, but here are the CoCo jack connections:

1- X Potentiometer
2- Y Potentiometer
3- Ground
4- Firebutton 1
5- +5 Volts
6- Firebutton 2

The CoCo joystick may not operate as well on the Apple as it does on the CoCo or the Tandy 1000, but it should be usable. Note that if your joystick has only one button, it will act as Firebutton 1 and Button 2 may not be available. You may be able to use the "solid-Apple" key to the right of the space bar as a substitute.

### CoCo Commodore Compatibility

*I own a TRS-80, 16K Extended* BASIC *Color Computer. I have found this computer to be very incompatible with other computer accessories. My friend recently purchased a Commodore 128 that is a very nice setup. There is a lot of software that I would like to transfer over to my TRS-80, but can't. Every time I try to load one of the cassette programs into my computer, I get an I/O error. There must be some way to run programs back and forth. Can you tell me how to get the Commodore tapes to load on my TRS-80? Also, is there a reverse program for loading TRS-80 programs into the Commodore?*

*Kate Myers*
*Peterborough, NH*

℞ The Commodore is the incompatible machine. The CoCo uses all standard accessories. It has a standard RS-232 serial printer port, and it uses the same standard disk drives as the IBM PC. Software-wise, the two machines are totally incompatible. The CoCo uses the powerful MC6809 microprocessor while the Commodore uses the slow and impotent 6502. Worse yet, Commodore uses an archaic and slow (backing up a single-sided disk can take 20 minutes) serial interface to their disk drives, and this single interface is shared by other devices, so if you are printing a file from a disk, for example, the disk and printer both send/receive data even slower.

### Tell Me About Upgrades

*I have an older 16K Extended* BASIC *Color Computer 2. The board number is 20261043. I want to upgrade to 64K. I have read your column, and you touch on upgrading. I have eight 4164 64K dynamic RAMs, 150 nanoseconds. I need to know everything about upgrading my machine. I don't have a disk drive.*

*Terry Cooper*
*Fostoria, OH*

℞ Assuming you have the original CoCo 2 (made in USA, small white case), remove the eight 4116 16K-by-1 memory chips from sockets U14 to U21, then solder a wire connecting the two solder pads to the right of W1, then install your eight new 4164 64K-by-1 memory chips oriented properly in their sockets. If you have the first generation Korean CoCo 2, remove the eight 2118 16K-by-1 memory chips (they are located in two places: a group of three and a group of five). Solder a wire connecting the two pads in the box marked 64K, then install the eight new 4164 64K-by-1 memory chips oriented properly in their sockets.

Note: If you have no previous printed circuit board soldering experience, leave these upgrades to the pros!

**For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.**

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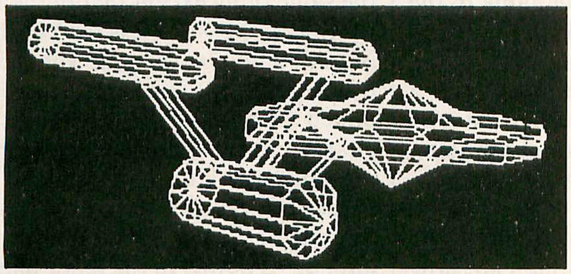

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*Transposition refinements for* Music +

# The Sweet Strains of CoCo

## By Joseph D. Platt

This is a refinement for the *Music+* program by Bob Ludlum from the June 1984 and June 1986 RAINBOW. *Transpose* allows you to transpose music in memory. The range of each transposition is unison minus six steps to unison plus five steps. For example, if the original note was C4, the L6 command would lower the note six steps to F#3. Likewise, the R5 command would raise C4 (middle C) to F4, five steps above C4.

To add the transpose feature to a cassette-based system, you need to add Line 28, Line 121 and lines 9600 to 9840. Line 9030 must be revised to display the (X)pose message in the alternate menu. Refer to Listing 1 for the new lines and the revised Line 9030.

The disk version requires that you delete lines 6099 to 6180, the data for "Toy For Two Lutes," and lines 45, 54 and 55 from the setup portion of the program. This must be done to prevent an out-of-memory condition from occurring when the transpose code is added.

The transpose routine is called from the alternate menu. The alternate menu is accessed by pressing the @ key. The alternate menu indicates that pressing the X key will invoke the (X)pose function. Lines 9600 to 9645 print the instructions to the screen and process the inputs required to carry out the selected function.

Lines 9700 to 9740 perform the Raise function. All notes are stored in memory as even integers as in *CoCo Composing* by Larry Konecky in the December 1983 RAINBOW. The *Music+* program converts the note name to the equivalent number, C4 to 50, for example. The value for C3 (26) is 24 less than C4 (50). The octave spread of 24 is a result of the 12 steps between notes of the same name (not counting the starting note) multiplied by two.

Line 9620 selects 9625 if the R key is pressed. Line 9625 asks the user to enter a number from 1 to 5 to indicate how many steps to raise the music. Line 9630 verifies that the input is within the specified range and then sets the variable `XR` to equal two times the value input. `XR` will always be an even number from 2 to 12 for Lower or 2 to 10 for Raise.

Line 9700 establishes a loop to read the music memory. The `STEP 5` option in the loop ensures that the loop variable `QL` always points to the memory address that contains the note length data. If that data is 0, then the music has ended. Line 9705 tests for this condition. If it is true, `PEEK(QL)=0`, then *Transpose* is terminated and the music entry menu is displayed. If `PEEK(QL)<>0`, lines 9710 through 9725 are called to read each note in the chord and add `XR`, the transpose offset, to its value. The exception to this is that if the value of `Qn=PEEK(QL+n)+XR` exceeds 96, then 24 is subtracted from `Qn` to lower the note an octave. At this time, the new note, `Qn+XR`, is poked into location `(QL+n)`. Line 9730 controls the loop, and Line 9740 directs the program to go to the music entry menu setup in Line 60.

Lines 9800 through 9840 accomplish the same thing except that in the Lower routine, if `Qn+XR` is less than 8, then 24 is added to `Qn` to raise the note an octave, then `XR` is added. The result is poked into address `(QL+n)`. In these examples, the letter *n* represents an integer from 1 to 4. A 1 added to `QL` causes the value of the soprano note to be read. Likewise `QL+2` points to the alto, `QL+3` points to the tenor and `QL+4` points to the bass note.

In each of the note processing lines, 9710 to 9725 and 9810 to 9825, if `PEEK(QL+N)=0` (meaning the note is silent or a rest), then no change is made, and the next note line is called. I had some strange sounding chords before I added the '0' test.

The transpose routine can be called repeatedly to raise or lower the music to the desired key. A word of caution — too many transposes in the same direction will result in a chord with some of its notes an octave off from the original relationship.

*(You may direct questions about this modification to Mr. Platt at Route 1, Box 2530, Quinton, AL 35130, 205-436-3362. Please enclose an SASE for a reply when writing.)* ☐

---

*Joe Platt lives in Quinton, Alabama, and is the children's pastor and bus director at Hopewell Baptist Church. He holds a first class FCC license and has worked with his CoCo for four years.*

**Editor's Note: For your convenience, the complete updated version of this program will be included on both RAINBOW ON TAPE and RAINBOW ON DISK. Three music files, `OLD100TH`, `HOWGREAT` and `JESU JOY` will also be included and will immediately follow `MUSIC+TR`.**

**The listing:** `MUSIC+TR`

```
28 IF PEEK(&H4E84)=22 AND PEEK(&
H4E85)=0 AND PEEK(&H4E86)=136 AN
D PEEK(&H4E87)=134 THEN 60

121 IF LV=88 THEN 9600 'TRANSPOS
E

9600 CLS:PRINT@32,"**       COCO
TRANSPOSER      **"
9605 PRINT:PRINT"YOU MAY RAISE O
R LOWER THE       PITCH OF THE CO
MPOSITION IN      MEMORY BY CHANG
ING THE KEY IN    WHICH IT IS TO
BE PLAYED"
9615 PRINT@256,"PRESS   (R) TO RA
ISE, (L) TO     LOWER, OR (Q) TO
 QUIT"
9620 XP$=INKEY$:IF XP$="R" THEN
9625 ELSE IF XP$="L" THEN 9640 E
LSE IF XP$="Q"THEN 60 ELSE 9620
9625 PRINT@462,XP$:PRINT@384,"RA
ISE PITCH ENTER ( 1-5 )"
9630 XX$=INKEY$:XP=VAL(XX$):IF X
P<1 OR XP>5 THEN 9625 ELSE XR=XP
*2:PRINT@463,XP;" +";XR;:GOTO 97
00
9640 PRINT@462,XP$:PRINT@384,"LO
WER PITCH ENTER ( 1-6 )"
9645 XX$=INKEY$:XP=VAL(XX$):IF X
P<1 OR XP>6 THEN 9640 ELSE XR=XP
*-2:PRINT@463,XP;"  ";XR;:GOTO98
00
9700 FORQL=A5 TO 32003 STEP 5
9705 IF PEEK(QL)=0 THEN 60
9710 Q1=PEEK(QL+1):IF Q1=0 THEN9
715 ELSE IF Q1+XR>96 THEN Q1=Q1-
24+XR:POKE QL+1,Q1 ELSE Q1=Q1+XR
:POKE QL+1,Q1
9715 Q2=PEEK(QL+2):IF Q2=0 THEN
9720 ELSE IF Q2+XR>96 THEN Q2=Q2
-24+XR:POKEQL+2,Q2:ELSE Q2=Q2+XR
:POKEQL+2,Q2
9720 Q3=PEEK(QL+3):IF Q3=0 THEN
9725 ELSE IF Q3+XR>96 THEN Q3=Q3
-24+XR:POKEQL+3,Q3:ELSE Q3=Q3+XR
:POKEQL+3,Q3
9725 Q4=PEEK(QL+4):IF Q4=0 THEN
 9730 ELSE IF Q4+XR>96 THEN Q4=Q
4-24+XR:POKEQL+4,Q4:ELSE Q4=Q4+X
R:POKEQL+4,Q4
9730 NEXTQL
9740 GOTO 60
9800 FORQL=A5 TO 32003 STEP 5
9805 IF PEEK(QL)=0 THEN 60
9810 Q1=PEEK(QL+1):IF Q1=0 THEN
9815 ELSE IF Q1+XR<8 THEN Q1=Q1+
24+XR:POKE QL+1,Q1 ELSE Q1=Q1+XR
:POKE QL+1,Q1
9815 Q2=PEEK(QL+2):IF Q2=0 THEN
9820 ELSE IF  Q2+XR<8 THEN Q2=Q2
+24+XR:POKE QL+2,Q2:ELSE Q2=Q2+X
R:POKE QL+2,Q2
9820 Q3=PEEK(QL+3):IF Q3=0 THEN
9825 ELSE IF Q3+XR<8 THEN Q3=Q3+
24+XR:POKE QL+3,Q3:ELSE Q3=Q3+XR
:POKE QL+3,Q3
9825 Q4=PEEK(QL+4):IF Q4=0 THEN
9830 ELSE IF Q4+XR<8 THEN Q4=Q4+
24+XR:POKE QL+4,Q4:ELSE Q4=Q4+XR
:POKE QL+4,Q4
9830 NEXTQL
9840 GOTO60



9030 PRINT@417,"(T)EMPO ";:PRINT
@428," (K)OPY ";:PRINT@439," (M)
OVE ";:PRINT@449,"(X)POSE ";:PRI
NT@460,"        ";:PRINT@471," (
Z)ERO ";
```

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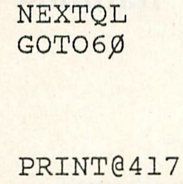
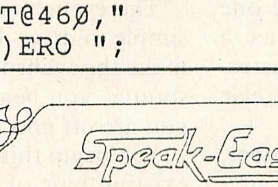


Harvey says, "Finally, I can ask for dinner."



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30 GOTO 10
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# The Creative Muse: How to Dredge Up Those Ideas

**By Joseph Kolar**
**Rainbow Contributing Editor**

Last month you were left hanging with a half-baked happy face. You were challenged to use one of the variations you saved as a jumping-off point to create a masterpiece of animation or whatever else your fertile brain dredged up.

How do you get ideas? Remember, creativity is within the domain of anybody who tries. Since all people are unique, they will wander down different paths looking for inspiration.

Creating a masterpiece, based on the given happy face, should not intimidate you. You may not be a Rembrandt, but original work should be a joy to behold. Thus, even though it is a crude drawing, it is still something special.

Here is my secret "noodle-prodder" — a way to get ideas. I display a version of the happy face, the project at hand. If possible, I put the animated display into a perpetual loop. If I am unable to keep the action going, I run the program over and over again. Sometimes, it may drive me coocoo for a half-hour or longer. My secret is to sit there and stare at it. I concentrate on each element and think, "What can I do?" If nothing comes to mind, I look away or daydream. I may get up and walk away. I will return and concentrate again, looking for an easy element to work on.

The eyebrows of the happy face are simple to draw. Happy face cries out to make the eyebrows go up and down. As soon as you begin to develop the idea, you are off and running creatively.

You begin thinking, "I must erase the existing pair of eyebrows. Then I can raise the vertical-locating value a few units and draw them. Then I must erase the higher set. No! There are no eyebrows at all. I have to make sure the original pair are called. One way is to draw the lower set again. There are other ways, but I can't figure them out. But, so long as I have one safe way to accomplish my desired mission, I am in good shape."

You are on your way!

Consider each idea or sub-idea as an individual problem and solve each, sequentially.

Rest assured, you need not think your way through the entire problem. As you erase the eyebrows, your mind will present the next problem. Every time you finish a problem, the next one is either being suggested or waiting in the wings. You will have solved all the problems and added a new dimension to the happy face. When you are satisfied that you have achieved your goal, make a save and/or a listing of your recently minted program.

Display the newly crafted work on the screen and try to figure out something else to do to it. There will be times when you are unable to solve some vexing problem. That's life!

After toying with the challenging problem for some time, stop! Make a save; sleep on it. If you are gung-ho, your mind will sort through possible avenues of attack. Remember, you can always return to face up to the thwarting gremlin in the program.

My motto is, "If you can think of something to do, CoCo usually has a way to do it." It may not be readily apparent, but persistence pays off. Remember, you are apt to learn more meaningfully when you try working out a problem and toss aside each unworkable approach.

Which is more satisfying? Copying my listings and following along on a tutorial or expressing yourself by digging in and doggedly creating some goodie on your own initiative? Hard-won success is so much sweeter.

At this time, look over Listing 1. You will note that it is rather long, considering the final result. A running record or memory left on my 16K ECB CoCo was kept. As the program ballooned, and knowing that happy face might be just a portion of a *greater program, it* became more important to keep track of memory used. In fact, lines 2 to 99 were kept in a virgin state, for some other unrelated program insertion.

Often, you may wonder why I did it this way. Why did I do it in a sloppy, memory-wasting, redundant way? Why didn't I take out the chaff and revise the

---

*Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.*

program lines to make a tighter, more elegant finished product?

When in hot pursuit of a solution, you are unconcerned with techniques. The main purpose is to find solutions. When one solution after another tumble into place, you keep creating. At such times, who cares about sloppy or disorganized program lines and routines? First things first! So long as you get answers to your problems that you can live with, and make a working program, everything else follows.

You may key in listings 1 and 2 for practice and amusement. You may prefer to key in and save Listing 2 only. Listing 1 is buried in Listing 2. Without further discussion, you are left on your own to locate and identify the subroutines that comprise most of the enhancements of Listing 2. It seems easier to study Listing 1, which purports to create a talking happy face first and then study the final version.

Back to the keyboard. Here is an example of doodling and the eight programs that resulted. Staring at the beckoning blank screen, I began simply enough:

```
10 PMODE4,1:PCLS:SCREEN1,0
15 FOR X=4TO24STEP4
20 DRAW"S=X$;BM128,96U2R4
D2L4"
25 NEXT
100 GOTO100
```

Type `RUN`. Nothing special! Change Line 15 to read:

```
15 FOR X=1 TO 24 STEP2
```

This produced an interesting two-tone effect that intrigued me. What could I do with it? Type `NEW` and key in `ADESIGN`. First, I decided to make four boxes around a convenient central point, `128,96`. Place a `REM` in front of lines 5 and 90 and change Line 10 to read `4` rather than `P` and run. Curious to see how this design would look in all `PMODE`s, lines 5 and 90 were unmasked and Line 10 read `P` instead of `4`. Run. That was interesting! In Line 10, `SCREEN1,0` was changed to `SCREEN1,1` temporarily, to see how the other set looked. Run. Replace `SCREEN1,0` in Line 10 and save `ADESIGN`.

Notice, in a barracuda-like frenzy of creating, a separate loop routine was used to place each A option around the central point. Note also, `$` in the four `DRAW` lines was not required. Further, Line 90 could be deleted and Line 85 revised to `85 NEXTX,P`. Right now, we are creating, not refining. Later on, we shall tend to this chore. Type `NEW`.

Key in `TWOKINDS`. The best display was `PMODE4,1`. It was decided to make an angle point and each A option line, `D2`, was altered to `FG`. The four loops were condensed to one loop. `S=X` was removed from lines 40, 60 and 80 since the size would be the same in all four units. A slight pause was added after each display to give it a jerky, blinking effect. Now run.

To add larger units in random steps, Line 15 was unmasked and Line 16 masked. This gave rise to some colorful variations. Save `TWOKINDS` and type `NEW`.

Rather than key in all of the remaining listings, you may want to make alterations in `TWOKINDS`. If so, ignore all further key in and `NEW` instructions. It will evolve, generation by generation, into the final listing.

Key in `CROSS`. I decided to push the four units apart to make a cross. This was done by relocating the `128, 96` central point in lines 20 through 80.

Line 15 was altered with `STEP-3` so the elements in each unit would decrease in size. Run. Now, change to `STEP-4` and run. Try `1` and `2`. Save `CROSS` and type `NEW`.

Tiring of the results, all the locations were restored to `128,96` and the units were altered to be twice as wide. `U2` and `FG` were doubled in value to `U4` and `F2G2` in lines 20 through 80. Run. It looked like a hidden swastika but otherwise was a pedestrian design. Save `A1` and type `NEW`.

Key in `A2`. The object was to put an angle on the remaining outer border of each unit. This was done quickly by changing `R4F2` to `E2F4` in lines 20 through 80. Run. This wasn't too bad! Save `A2` and type `NEW`. Time to fool around.

Key in `A3`. The `F4G2` portions of each A option unit were blanked out; `BF4G2` in lines 20 though 80 and `STEP 4` replaced `-3`. Now run. A feathery effect was created. Save `A3` and type `NEW`.

Key in `A4`. Time to tighten up and ultimately simplify the program. The `E2` was changed to `R4` and the location of the unit of design was pulled from lines 20 through 80 and placed in a string variable in Line 11. The string variable, `A$`, was concatenated to each A option.

Now, mask lines 40 through 80. Run. Can you imagine what the design will look like, as you release each additional design unit by unmasking each A option in turn? Unmask Line 40 and run. Unmask Line 60 and run, and then Line 80 and run. This proves the point that observing a single unit doesn't reveal the end result when using A options. Save `A4` and type `NEW`.

Key in `A5`. The only change is the removal of the two `B`'s in Line 16. By adding the long side of the angle, `F4`, and the short side, `G2`, to the previous program, we alter the appearance of the design considerably. Run.

To make the design symmetrical, change `G2` to `G4`. If you want to save both variations, mask Line 16 and create `17 A$="BM128,96U4R4F4 G4L4"`. Make a comment at the end of Line 0, `TWO VARIATIONS AT 16-17`, as a reminder. Save `A5`.

`A5` is a linear descendant of `ADESIGN`. You saw it evolve, generation after generation. Changing values and steps in the loop in Line 15 will do wonders. So will changing the shape of the design element in Line 17.

Consider a minor change in Line 17. Change `R4` to `R3` and run. Did you see the difference? No? Well, change `R3` to `R2` and run. What happens when you change `R2` to `R`? The change is dramatic.

Only one direction, `R`, was altered while the others remained constant. Can you imagine all the possibilities available to be manipulated and explored?

By constant experimentation, you may luck into a unique display that may be worth saving for posterity. More importantly, the resultant display may give you ideas to pursue and suggest new channels for investigation. Your mind may be jogged into developing a new approach.

Just one last change. (See how addictive experimentation can become?) Change `R` to `E4` and run.

These casual, unpremeditated changes can, and often do, lead to unintentional but superb designs.

One more and that's it. Promise! Change Line 15 to `STEP-2` and run. One more, OK? Change `F4` to `BF4` and run.

You see, there is no end. Try changing Line 15 to `STEP-3` and then `STEP-1`.

Whew! There are so many things to check out. It seems the more alterations or modifications you make, no matter how trivial the change, the more you are lead remorselessly from one generation to the next. I hate to admit it, but we have progressed through about 12 generations from `ADESIGN` with no end in sight.

I was compelled to turn CoCo off or this tutorial would never be completed. I leave it to you to have fun, burning the midnight oil, creating all kinds of goodies that may have been based on the seeds scattered here. ☐

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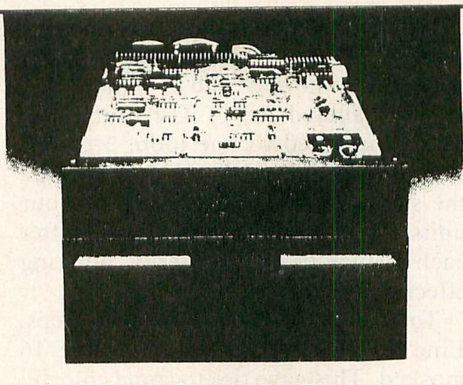

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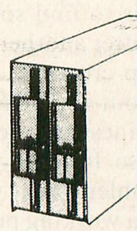

40 Tks 6Ms
Double Sided
Double Density

40 or 80 Tracks
½ Hght. Teac/Panasonic

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## Free Software for Drive 0 Systems

**CoCo Checker...Test roms, rams, disk drives and & controller printer, keyboard cassette & more.**
**Tape/Disk Utility...Transfers disk to tape and tape to disk.**

**169.95** Drive 0

- Full Ht Drive
- Single Case
- Heavy Duty Power Supply
- 2 Drive Cable
- Gold plated contacts
- Controller & manuals

**189.95** Drive 0

- Double Sided Slim Line Drive
- Case holds 2 slim line drives
- Heavy Duty Power Supply
- 2 Drive Cable
- Gold plated contacts
- Controller & Manuals

**289.95** Drive 0 & 1

- 2 Double Sided Slim Line Drive
- Case holds 2 slim line drives
- Heavy Duty Power Supply
- 2 Drive Cable
- Gold plated contacts
- Controller & Manuals

## Other Drive Specials

Drives cleaned, aligned & tested, **29.95**

**119.95**
2nd Drive
for new Radio Shack
includes:

- Slim Line DS/DD Drive
- Cabling & Instructions
- Mounting Hardware

| | |
|---|---|
| Full Ht Drive | 89.95 |
| Full Ht Drive Ps/Case | 129.95 |
| Slim Line Drive | 99.95 |
| Slim Line Drive Ps/Case | 139.95 |
| 2 Slim Drives Ps/Case | 239.95 |
| Disk Controller | 59.95 |
| Single Ps & Case | 44.95 |
| Dual ½ht Ps & Case | 54.95 |
| Dual Full Ht. Ps & Case | 79.95 |
| Disk Controller | 59.95 |
| 10 Diskettes with free library case | 9.95 |

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Hours: Mon.-Sat., 9-6 (EST)

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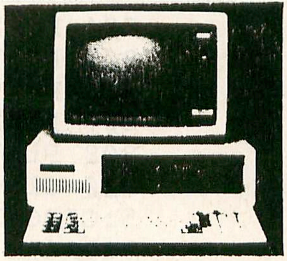
## Software Included

- Pc-Write word processor
- Pc-Calc Spreadsheet
- Pc-File Database
- Print Spooler
- Ram Disk
- Runs all popular software



## IBM XT COMPATIBLE

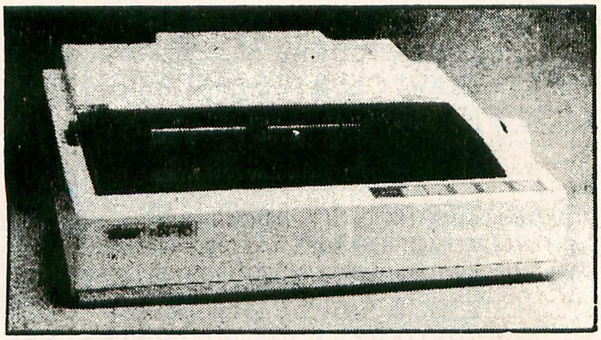
*Complete system* *only* **699 95**

## Hardware Included

- 4.77 mhz and 8mhz Turbo
- 360k Floppy Disk Drive
- Monochrome or Color Card
- At style Case w/pwr light & key
- Game, Printer and Serial Port
- Real Time Clock
- 150 watt power supply
- 640k memory
- At keyboard optional expanded
- Monochrome Monitor
- Optional Hard Disk Drive

**star** PRINTERS

PRINTER CABLES AND
INTERFACES AVAILABLE
Call for current pricing

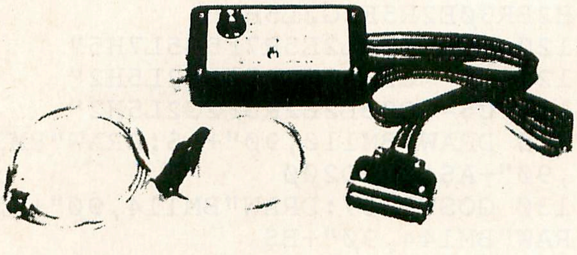


| | |
|---|---|
| NP10 (New 100 CPS NLQ 80 col.) | 189 95 |
| NX10 (New 120CPS NLQ 80 col.) | 219 95 |
| NX15 (New 120CPS NLQ 132 col.) | 379 95 |
| Power Type (18CPS Daisy Wheel) | 249 95 |

## Complete Packages

NP10 **249 95**
*includes:*
- Star NP10 Printer
- Interface
- Screen Dump Program

NX10 **279 95**
*includes:*
- Star NX10 Printer
- Interface
- Screen Dump Program



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- 300-19,200 BAUD rates
- External to printer — No AC plugs
- Built in modem/printer switch — No need for Y-cables or plugging/unplugging cables

*only* **54 95**
Power supply + 5.00

## 64K Upgrades 19 95

## Video Driver 29 95

Enables your CoCo to operate with a video monitor instead of a television!

## Screen Dump Program 19 95

The best screen dump program for the Epson & Star printers ever!! Have the option of standard images reverse w/regular or double sized pictures.

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**Order Toll Free 1-800-635-0300**

*Listing 1:*

```
0 '<LISTING1> 11-28-'86
100 PMODE4,1:PCLS:SCREEN1,1
104 GOTO110
105 FORZ=1TO40:NEXT:RETURN
106 FORZ=1TO50:NEXT:RETURN
107 FOR Z=1 TO 150:NEXT:RETURN
110 CIRCLE(130,98),50,1,.8
111 CIRCLE(80,96),10,1,.9,.25,.7
5
112 CIRCLE(180,96),10,1,.9,.75,.
25
113 DRAW"BM130,58H3E3H3E3H3E3H3"
114 DRAW"BM105,66U2H4U4H4":DRAW"
BM155,66U2E4U4E4"
115 DRAW"BM127,95BLD9F3R5E3U9"
116 DRAW"C1BM112,118F3M+15,7R5M+
15,-7E3U2"
117 DRAW"BM114,89C1BL2E2R5F2G2L5
H2BR30E2R5F2G2L5H2"
120 A$="C1BL2E5R7F5G5L7H5"
121 B$="C1BL2E2R5F2G2L5H2"
122 C$="C0BL2E2R5F2G2L5H2"
125 DRAW"BM110,90"+A$:DRAW"BM140
,90"+A$:GOTO200
130 GOSUB107:DRAW"BM114,90"+B$:D
RAW"BM144,90"+B$
131 GOSUB107:DRAW"BM114,90"+C$:D
RAW"BM144,90"+C$:RETURN
200 X=RND(4): ON X GOTO 201,202,
203,204
201 GOSUB130:GOSUB700:GOSUB1100:
GOTO125
202 GOSUB130:GOSUB600:GOTO125
203 GOSUB1000:GOSUB500:GOTO117
204 GOSUB130:GOSUB500:GOSUB1200:
GOTO125
500 DRAW"C0BM112,118FEM+15,7R5M+
15,-7E3":GOSUB800:GOSUB105:DRAW"
C1BM112,118FEM+15,7R5M+15,-7E3":
RETURN
600 FORY=1TO3:DRAW"C0BM130,58H3E
3H3E3H3E3H3":GOSUB106:DRAW"C1BM1
30,58E3H3E3H3E3H3E3":DRAW"C0BM13
0,58E3H3E3H3E3H3E3":DRAW"C1BM130
,58H3E3H3E3H3E3H3":NEXT:RETURN
700 FOR Y=1TO2:DRAW"C0BM109,80E2
R9F2BR18E2R9F2":GOSUB106:DRAW"C1
BM109,78E2R9F2BR18E2R9F2":GOSUB1
06:DRAW"C0BM109,78E2R9F2BR18E2R9
F2":GOSUB106:DRAW"C1BM109,80E2R9
F2BR18E2R9F2":NEXT:RETURN
800 X=RND(8): ON X GOTO 801,802,
803,804,805,806,807,808
801 PLAY"O2V25L16ACEF":RETURN
802 PLAY"O3V30L16CEFA":RETURN
803 PLAY"O4V20L32EFAC":RETURN
804 PLAY"O5V30L32CAFE":RETURN
805 PLAY"O5V20L32FCEA":RETURN
806 PLAY"O2V30L16FCAE":RETURN
807 PLAY"O3V20L32EACF":RETURN
808 PLAY"O5V30L32FACE":RETURN
900 CIRCLE(80,96),10,0,.9,.25,.7
5:CIRCLE(180,96),10,0,.9,.75,.25
:CIRCLE(80,96),10,1,1.1,.25,.75:
CIRCLE(180,96),10,1,1.1,.75,.25:
GOSUB105:CIRCLE(80,96),10,0,1.1,
.25,.75:CIRCLE(180,96),10,0,1.1,
.75,.25
901 CIRCLE(80,96),10,1,.9,.25,.7
5:CIRCLE(180,96),10,1,.9,.75,.25
:RETURN
1000 DRAW"C0BM127,95BLD9F3R5E3U9
":DRAW"C1BM127,95BLBD2D14F3R5E3U
14":GOSUB800:GOSUB107:DRAW"C0BM1
27,95BLBD2D14F3R5E3U14":DRAW"C1B
M127,95BLD9F3R5E3U9":RETURN
1100 FORX=1TO3:DRAW"C0BM105,66U2
H4U4H4":DRAW"C0BM155,66U2E4U4E4"
:DRAW"C1BM105,66U2E4U4E4":DRAW"C
1BM155,66U2H4U4H4":GOSUB106:DRAW
"C0BM105,66U2E4U4E4":DRAW"C0BM15
5,66U2H4U4H4":DRAW"C1BM105,66U2H
4U4H4":DRAW"C1BM155,66U2E4U4E4":
NEXT:RETURN
1200 DRAW"C0BM105,66U2H4U4H4":DR
AW"C0BM155,66U2E4U4E4":DRAW"C1BM
105,66U2H4U4E4":DRAW"C1BM155,66U
2E4U4H4":GOSUB106
1201 DRAW"C0BM105,66U2H4U4E4":DR
AW"C0BM155,66U2E4U4H4":DRAW"C1BM
105,66U2H4U4H4":DRAW"C1BM155,66U
2E4U4E4":RETURN
```

*Listing 2:*

```
0 '<LISTING2> 11-29-'86
1 'MEM 5154
100 PMODE4,1:PCLS:SCREEN1,1
101 DRAW"S8BM48,28U6F3E3D6BR3U6R
4D4L2NL2F2BR2RBR5 U6NL2R2BR3NR4D
3NR3D3R4BR3U6R4D4NL4D2BR6U3NU3R2
NE3F3BR3 NR4U3NR3U3R4BR3R2NR2D6
BR7U6NL2R2BR3D6R3BR3NR4U3NR3U3R4
S4"
102 DRAW"C1BM118,170U6R3FD4GNL2B
R5U6R3FD2GL3BRF2BR5NU6BR5U6R3FD2
GL3"
104 GOTO109
105 FORZ=1TO40:NEXT:RETURN
106 FORZ=1TO50:NEXT:RETURN
107 FOR Z=1 TO 150:NEXT:RETURN
109 DRAW"C1BM109,80E2R9F2BR18E2R
9F2"
110 CIRCLE(130,98),50,1,.8
111 CIRCLE(80,96),10,1,.9,.25,.7
5
```

## DataPack II Plus V4.1

### SUPER SMART TERMINAL PROGRAM

### AUTOPILOTand AUTO-LOG Command Processors

### X-MODEM DISK FILE TRANSFER SUPPORT

### VT-100 & VT-52 TERMINAL EMULATION

* No lost data using Hi-Res Display, Even at 1200 Baud on the Serial port.
* 9 Hi-Res Displays, 28 to 255 columns by 24 lines & true Upper/Lower case.
* 45K Text Buffer when using the Hi-Res Text Display and Disk .
* ASCII & BINARY disk file transfer support via XMODEM.
* Directly record receive data to a disk file while online.
* VT-100 terminal emulation for VAX, UNIX and other systems.
* VT-100/52 cursor keys & position, insert/delete, PF & Alt. Kbd. keys.
* Programmable Word Length, Parity, Stop Bits and baud rates 300 to 9600.
* Complete Full and Half Duplex operation, with no garbled data.
* Send full 128 character set from Keyboard with control codes.
* Complete Editor, Insert, Delete, Change or Add to Buffer.
* 9 Variable length, Programmable Macro Key buffers.
* Programmable Printer rates from 110 to 9600 Baud.
* Send Files directly from the Buffer, Macro Key Buffers or Disk.
* Display on Screen or Print the contents of the Buffer.
* Freeze Display & Review information On line with no loss of data.
* Built in Command Menu (Help) Display.
* And much, much more.

Supports: Word-Pak I, II, R.S. and Double Density 80 Column Cards
Disto Controller w/80 column card & parallel printer
PBJ Parallel Printer Card and Dual Serial Port (2SP-Pak)
R. S. Modem-Pak & Deluxe RS-232 Pak, even with Disk.

**Requires 32K & Disk, Only $59.95**

---

## HI-RES II Screen Commander

Tired of looking at the 16 line by 32 character display on your CoCo? Wish you could see more lines and characters? Then HI-RES II is the answer, it can give you the big screen display you've always wanted. It will display 24 lines of 32, 42, 51, 64 and even 85 true upper and lower case characters per line without extra hardware.

HI-RES II is the most powerful screen enhancement package available for the Color Computer, yet it is the least expensive. It is completely compatible and transparent to Basic. Once the program is loaded, everything works the same as before, only you have a much better display to work with. It even allows you to have mixed text and Hi-resolution graphics on the same screen or have separate text and graphics screens. It also has an adjustable automatic key repeat feature and allows you to protect up to 23 lines on the screen.

HI-RES II features over 30 special control code functions that allow you to change characters per line, protect display lines, change background color, position cursor, switch normal/reverse video, underline, double size characters, erase line/screen/to end of screen, home cursor, character highlight and much more. It works on all models of the CoCo with 16, 32 or 64K and provides automatic reset control so HI-RES II won't disappear when you press reset.

**Only 24.95 on Tape or $29.95 on Disk**

---

## "The Source"

Now you can easily Disassemble Color Computer machine language programs directly from disk and generate beautiful, Assembler Source Code. And "The Source" has all the features and functions you are looking for in a Disassembler.

* Automatic Label generation and allows specifying FCB, FCC and FDB areas.
* Disassembles programs directly from Disk or ROM.
* Output Disassembled listing with labels to the Printer, Screen or both.
* Generates Assembler source files directly to disk. or a printed listing.
* Generated source files are in standard ASCII format.
* Built in Hex/ASCII dump/display to locate FCB, FCC and FDB areas.
* Built in Disk Directory and Kill file commands.
* Menu display with single key commands for smooth, Easy operation.
* Written in fast machine language, one of the easiest to use Disassemblers

**Requires 32K Disk $34.95**

---

## TEXTPRO III

### "The Advanced Word Processing System"

* 9 Hi-Res Displays from 28 to 255 columns by 24 lines & Upper/Lower Case
* Three Programmable Header lines that can be re-defined at anytime.
* Programmable Footer line & Automatic Footnote System.
* 10 Programmable Tab stops & 7 Powerfull Tab Function Commands.
* Completely Automatic Justification, Centering, Flush left and right.
* On screen display of underline and Double size characters.
* Change indents, margins, line length, etc. parameters anytime in the text.
* Create and Edit files larger than memory, up to the size of a full disk.
* Easily imbed any number of format and control codes.
* Automatic Memory sense 16-64K with up to 48K of memory workspace.
* Fully supports the use of 80 column hardware cards.

TEXTPRO III is an advanced word processing system designed for speed, flexability and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, then most likely you'll be better off with one of the other simpler word processors. But, if you want a powerful word processor with extensive document formatting features to handle large documents, term papers, manuals, complex formating problems and letter writing, then TEXTPRO III is what your looking for. TEXTPRO works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 50 different formating commands you can use without ever leaving the text your working on. There are no time comsuming, and often furstrating menu chases, you are in total control at all times. The formatted output can be displayed directly on the screen, showing you exactly what your printed document will look like before a single word is ever printed. This includes margins, headers, footers, page numbers, page breaks, underlining, column formating and full justification.

**DISK $59.95 TAPE $49.95**

---

## The CBASIC Editor/Compiler V1.1.2

Do you want to write fast machine language programs but you don't want to spend the next few years trying to learn how ???
Well with CBASIC, you could be writing them right now!

CBASIC is the only fully integrated Basic Compiler and program editing system available for the Color Computer. It will allow you to take full advantage of all the capabilities available in your color computer without having to spend years trying to learn assembly language programming. CBASIC allows you to create, edit and convert programs from a language you are already familiar with Extended Disk Color Basic, into fast efficient machine language programs easily and quickly. We added advanced features like a full blown program editor, Hi-Res text Displays and 80 column hardware support for editing, compiling and your compiled programs. Plus we made it exceptionally easy to use, CBASIC is the friendliest and easiest compiler available for the Color Computer.

*"The most complete Editor/Compiler I have seen for the CoCo... "*
*--The RAINBOW, March 1986*

CBASIC is a powerful tool for the Beginner as well as the Advanced Basic or Machine Language programmer. You can write programs without having to worry about the Stack, DP Register, memory allocation and so on, because CBASIC will do it for you automatically. Or, CBASIC will let you control every aspect of your program, even generating machine code directly in a program easily.

CBASIC features well over 100 compiled Basic Commands and Functions that fully support Disk Sequential and Direct access files, Tape, Printer and Screen I/O. CBASIC supports ALL the High and Low Resolution Graphics, Sound, Play and String Operations available in Extended Color Basic, including Graphics GET, PUT, PLAY and DRAW, all with 99.9% syntax compatibility. CBASIC also supports the built in Serial I/O port with separate printer & serial I/O baud rates. You can send and receive data with PRINT, INPUT and INKEY commands.

CBASIC has its own completely integrated Basic Program Editor which allows you to load, edit or create programs for the compiler. It is a full featured editor designed specifically for writing and editing Basic programs. It has block move & copy, program renumbering, automatic line numbers, screen editing, printer control and more.

*"The Editor is a very good one and could be the subject for review all by itself..."* *--The RAINBOW, March 1986*

*"Comparing ECB's edit mode to CBASIC's text editor is like comparing a World War II jeep to a modern sedan. Both get you to your destination, but what a difference in the ride.* *-- Hot CoCo, Feburary 1986*

The documentation for CBASIC is an 8 1/2 * 11 Spiral Bound book which contains approximately 120 pages of real information.

*"CBASIC's manual is easy to read and written with a minimum of technicalese."* *--Hot CoCo February, 1986*

The price of CBASIC is $149.00. It is the most expensive Color Basic Compiler on the market, and well worth the investment. Compare the performance of CBASIC against any Color Basic compiler. Dollar for dollar, CBASIC gives you more than any other compiler available. Requires 64K & Disk, not JDOS compatible.

*"The price tag it carries seemed a bit steep for an integer compiler on first glance, but when you add 64K, hi-res drivers, and full-screen editing, CBASIC begins to look more like a bargain.."* *-- Hot CoCo February, 1986*

*"A Complete Editor/Compiler Well Worth its Price" --RAINBOW March 1986*

---

## EDT/ASM 64D

### 64K DISK EDITOR ASSEMBLER

EDT/ASM 64D is a Disk based co-resident Text Editor & Assembler. It has a Hi-Resolution 51, 64 or 85 column by 24 line display, so you see your program listings easily and it supports Column cards. The disk also contains a free standing ML Debug Monitor, to help you debug your assembled programs.

This is the most powerfull, easy to use Text Editor available in any Editor/ Assembler package for the Color Computer. It even has automatic line number generation for easy entry of program material.

* Local and Global string search and/or replace.
* Full screen line editing with immediate line update.
* Easy to use Single keystroke editing commands.
* Load &Save standard ASCII formatted Tape/Disk files.
* Move or Copy single & multiple text lines.
* Create and Edit disk files larger than memory.
* Hi-Res Text Display 28 to 85 columns by 24 lines.
* Supports Word-Pak I ,II. & R.S. and Disto 80 column display cards.

The Assembler portion of EDT/ASM 64D features include:

* Supports the full 6809 instruction set.
* Supports conditional IF/THEN/ELSE assembly.
* Supports Disk Library files (include).
* Supports standard motorola assembler directives
* Allows multiple values for FDB & FCB directives.
* Generates listings to Hi-Res text screen or printer.
* Assembles directly to disk or tape in LOADM format.
* Supports up to 9 open disk files during assembly.
* Allows assembly from editor buffer, Disk or both.

The freestanding DEBUG program provided includes:

* Examine and change the contents of memory.
* Set, Remove and display up to 10 breakpoints in memory.
* Display/Change processor register contents.
* Move a Block of memory or Fill Memory range with specified data.
* Search memory range for data pattern.
* Disassemble memory range into op-code format.

**Requires 32K Disk $59.95**

---

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(Monday thru Saturday, 8am to 5pm PST).

**CER-COMP**
**5566 Ricochet Avenue**
**Las Vegas, Nevada 89110**
**702-452-0632**

```
112 DRAW"C1BM179,90M+20,5F2D8L6U
3L16"
113 DRAW"BM130,58H3E3H3E3H3E3H3"
114 DRAW"BM105,66U2H4U4H4":DRAW"
BM155,66U2E4U4E4"
115 DRAW"BM127,95BLD10F3R5E3U10"
116 DRAW"C1BM112,118F3M+15,7R5M+
15,-7E3U2"
117 DRAW"BM114,89C1BL2E2R5F2G2L5
H2BR30E2R5F2G2L5H2"
118 DRAW"BM124,138D10M-15,-5D15M
+15,-5NU5ND5R12NU5ND5M+15,5U15M-
15,5NL12NU10"
119 F$="M-3,5F2RE2M-3,-5"
120 A$="C1BL2E5R7F5G5L7H5"
121 B$="C1BL2E2R5F2G2L5H2"
122 C$="C0BL2E2R5F2G2L5H2"
125 DRAW"BM110,90"+A$:DRAW"BM140
,90"+A$:GOTO200
130 GOSUB107:DRAW"BM114,90"+B$:D
RAW"BM144,90"+B$
131 GOSUB107:DRAW"BM114,90"+C$:D
RAW"BM144,90"+C$:RETURN
200 X=RND(5): ON X GOTO 201,202,
203,204,205
201 GOSUB130:GOSUB700:GOSUB1100:
GOTO125
202 GOSUB130:GOSUB600:GOSUB1300:
GOTO125
203 GOSUB1000:GOSUB500:GOTO117
204 GOSUB130:GOSUB500:GOSUB1200:
GOTO125
205 GOSUB900:GOSUB300:GOTO125
300 DRAW"C1BM198,103"+F$:GOSUB10
5:DRAW"C0BM198,103"+F$:DRAW"C1BM
198,113"+F$:GOSUB809:DRAW"C0BM19
8,113"+F$:DRAW"C1BM198,123"+F$:G
OSUB809:DRAW"C0BM198,123"+F$:DRA
W"C1BM198,133"+F$:GOSUB809:DRAW"
C0BM198,133"+F$
301 DRAW"C1BM198,144"+F$:GOSUB80
9:DRAW"C0BM198,144"+F$:FOR X=5TO
15:CIRCLE(200,160),X,1,.3:NEXT:G
OSUB810:FORX=15TO5STEP-1:CIRCLE(
200,160),X,0,.3:NEXT:GOSUB811:RE
TURN
500 DRAW"C0BM112,118FEM+15,7R5M+
15,-7E3":GOSUB800:GOSUB105:DRAW"
C1BM112,118FEM+15,7R5M+15,-7E3":
RETURN
600 FORY=1TO3:DRAW"C0BM130,58H3E
3H3E3H3E3H3":GOSUB106:DRAW"C1BM1
30,58E3H3E3H3E3H3E3":DRAW"C0BM13
0,58E3H3E3H3E3H3E3":DRAW"C1BM130
,58H3E3H3E3H3E3H3":NEXT:RETURN
700 R=RND(4):FOR Y=1TOR:DRAW"C0B
M109,80E2R9F2BR18E2R9F2":GOSUB10
6:DRAW"C1BM109,78E2R9F2BR18E2R9F
2":GOSUB106:DRAW"C0BM109,78E2R9F
2BR18E2R9F2":GOSUB106:DRAW"C1BM1
09,80E2R9F2BR18E2R9F2":NEXT:RETU
RN
800 X=RND(8): ON X GOTO 801,802,
803,804,805,806,807,808
801 PLAY"O2V25L16ACEF":RETURN
802 PLAY"O3V30L16CEFA":RETURN
803 PLAY"O4V20L32EFAC":RETURN
804 PLAY"O5V30L32CAFE":RETURN
805 PLAY"O5V20L32FCEA":RETURN
806 PLAY"O2V30L16FCAE":RETURN
807 PLAY"O3V20L32EACF":RETURN
808 PLAY"O5V30L32FACE":RETURN
809 PLAY"O5V25L128B-GP4":RETURN
810 PLAY"O4V30L16G":RETURN
811 PLAY"O2V30L16G":RETURN
900 CIRCLE(80,96),10,0,.9,.25,.7
5:CIRCLE(80,96),10,1,1.1,.25,.75
:GOSUB105:CIRCLE(80,96),10,0,1.1
,.25,.75:GOSUB105:CIRCLE(80,96),
10,1,.9,.25,.75:PLAY"O3L16CEGL8O
4CL16O3GL4O4C":RETURN
1000 DRAW"C0BM127,95BLD10F3R5E3U
10":DRAW"C1BM127,95BLBD2D10F3 BR
3BD6NM-16,3NM+16,2BU6BL3 R5E3U10
":GOSUB800:GOSUB107:DRAW"C0BM127
,95BLBD2D10F3 BR3BD6NM-16,3NM+16
,2BU6BL3 R5E3U10":DRAW"C1BM127,9
5BLD10F3R5E3U10":RETURN
1100 FORX=1TO3:DRAW"C0BM105,66U2
H4U4H4":DRAW"C0BM155,66U2E4U4E4"
:DRAW"C1BM105,66U2E4U4E4":DRAW"C
1BM155,66U2H4U4H4":GOSUB106:DRAW
"C0BM105,66U2E4U4E4":DRAW"C0BM15
5,66U2H4U4H4":DRAW"C1BM105,66U2H
4U4H4":DRAW"C1BM155,66U2E4U4E4":
NEXT:RETURN
1200 DRAW"C0BM105,66U2H4U4H4":DR
AW"C0BM155,66U2E4U4E4":DRAW"C1BM
105,66U2H4U4E4":DRAW"C1BM155,66U
2E4U4H4":GOSUB106
1201 DRAW"C0BM105,66U2H4U4E4":DR
AW"C0BM155,66U2E4U4H4":DRAW"C1BM
105,66U2H4U4H4":DRAW"C1BM155,66U
2E4U4E4":RETURN
1300 DRAW"C0BM124,138D10M-15,-5D
15M+15,-5NU5ND5R12NU5ND5M+15,5U1
5M-15,5NL12NU10": LINE(116,148)-
(146,188),PRESET,BF
1301 DRAW"C1BM124,142NU4D14M-15,
-5D15M+15,-5NU9ND8R12NU9ND8M+15,
5U15M-15,5NL12NU18":PLAY"O1V30L6
4CDEFGABC":GOSUB107
1302 DRAW"C0BM124,142NU4D14M-15,
-5D15M+15,-5NU9ND8R12NU9ND8M+15,
5U15M-15,5NL12NU18":DRAW"C1BM124
,138D10M-15,-5D15M+15,-5NU5ND5R1
```

# COCO-3 ONLY PRODUCTS

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- 54 Different Character Sizes available 14 to 212 cpl.
- **Bold**, *Italic* or Plain character styles.
- Double Width, Double Height and Quad Width characters.
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- Scroll Protect from 1 to 23 lines on the screen.
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- PRINT @ available in all character sizes.
- Programmable Automatic Key repeat.
- Full Control Code Keyboard supported.
- Full Cursor Control command support.
- Selectable Character & Background color.
- Color or Monochrome Display modes.
- Uses only 4K of Extended or Basic ram.
- Written in Ultra Fast Machine Language.

HI-RES III was designed to improve the standard display capabilities of the Color Computer 3, even the 40 and 80 column displays have several features missing. For example you can't use PRINT @ or have different character sizes on the same screen, even mixing text and graphics with the HPRINT command leaves a lot to be desired. HI-RES III can give you the kind of display capabilities you always dreamed about having on your color computer but didn't get with your COCO-3. Well now it's here and with a wide variety of display options that you can easily use with your Basic or ML programs. HI-RES III is totally compatible with *Enhanced Color* Basic and its operation is invisible to Basic. It simply replaces the normal screen display with an extremely versatile display package. It also overcomes some of the disadvantages found when using the Width 40 & 80 screens. You can use the Print @ function on any line length with HI-RES III. It also gives you a programmable automatic key repeat that can be very handy for editing your Basic programs. Automatic key repeat can be adjusted from ultra fast to super slow and can be disabled entirely if desired. You also get a full control code keyboard using the 'CTRL' key. So many of HI-RES III's extended functions can be controlled directly from the keyboard easily. With just a couple of simple keystrokes you can change character sizes and styles at any time. You can even switch back and forth between the standard COCO-3 display and HI-RES III with a simple keyboard entry or under program control. But, after you use HI-RES III, you most likely won't want to do without it again.

HI-RES III can be used for a wide variety of applications, with its many different character sizes and styles. You can make your program really look professional, with protected menus, Bold or Italic emphasis, Double or Quad characters for easy to read displays & menus. It can be ideasly suited for Video Titles or Store Displays. Printing Signs or Fliers in conjunction with a Hi-res Screen dump program. The visually impared will espically appreciate the extra large character sizes available.

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```
2NU5ND5M+15,5U15M-15,5NL12NU10"
1303 DRAW"C1BM118,170U6R3FD4GNL2
BR5U6R3FD2GL3BRF2BR5NU6BR5U6R3FD
2GL3":RETURN
```

**Listing 3:**

```
0 '<ADESIGN>
5 FOR P=0 TO 4
10 PMODEP,1:PCLS:SCREEN1,0
15 FOR X=1 TO 40STEP2
20 DRAW"A3S=X$;BM128,96U2R4D2L4"
25 NEXT
35 FOR X=1 TO 40 STEP2
40 DRAW"A1S=X$;BM128,96U2R4D2L4"
45 NEXT
55 FOR X=1 TO 40 STEP2
60 DRAW"A2S=X$;BM128,96U2R4D2L4"
65 NEXT
75 FOR X=1 TO 40 STEP2
80 DRAW"A0S=X$;BM128,96U2R4D2L4"
85 NEXT
90 NEXTP
100 GOTO5
```

**Listing 4:**

```
0 '<TWOKINDS>
10 PMODE4,1:PCLS:SCREEN1,1
15 'FOR X=20 TO 40 STEP RND(6)'M
ULTI
16 FOR X=20 TO 24 STEP4'BLINKING
 NEON
20 DRAW"A3S=X;BM128,96U2R4FGL4"
40 DRAW"A1BM128,96U2R4FGL4"
60 DRAW"A2BM128,96U2R4FGL4"
80 DRAW"A0BM128,96U2R4FGL4"
90 FOR Z=1 TO 200: NEXTZ,X
100 GOTO10
```

**Listing 5:**

```
0 '<CROSS>
10 PMODE4,1:PCLS:SCREEN1,1
15 FOR X=20 TO 4 STEP-3
20 DRAW"A3S=X;BM130,94U2R4FGL4"
40 DRAW"A1BM120,98U2R4FGL4"
60 DRAW"A2BM116,90U2R4FGL4"
80 DRAW"A0BM134,100U2R4FGL4"
90 FOR Z=1 TO 200: NEXTZ,X
100 GOTO10
```

**Listing 6:**

```
0 '<A1>
10 PMODE4,1:PCLS:SCREEN1,1
15 FOR X=20 TO 4 STEP-3
20 DRAW"A3S=X;BM128,96U4R4F2G2L4
"
40 DRAW"A1BM128,96U4R4F2G2L4"
60 DRAW"A2BM128,96U4R4F2G2L4"
80 DRAW"A0BM128,96U4R4F2G2L4"
90 FOR Z=1 TO 200: NEXTZ,X
100 GOTO10
```

**Listing 7:**

```
0 '<A2>
10 PMODE4,1:PCLS:SCREEN1,1
15 FOR X=20 TO 4 STEP-3
20 DRAW"A3S=X;BM128,96U4E2F4G2L4
"
40 DRAW"A1BM128,96U4E2F4G2L4"
60 DRAW"A2BM128,96U4E2F4G2L4"
80 DRAW"A0BM128,96U4E2F4G2L4"
90 FOR Z=1 TO 200: NEXTZ,X
100 GOTO10
```

**Listing 8:**

```
0 '<A3>
10 PMODE4,1:PCLS:SCREEN1,1
15 FOR X=20 TO 4 STEP-4
20 DRAW"A3S=X;BM128,96U4E2BF4BG2
L4"
40 DRAW"A1BM128,96U4E2BF4BG2L4"
60 DRAW"A2BM128,96U4E2BF4BG2L4"
80 DRAW"A0BM128,96U4E2BF4BG2L4"
90 FOR Z=1 TO 200: NEXTZ,X
100 GOTO10
```

**Listing 9:**

```
0 '<A4>
10 PMODE4,1:PCLS:SCREEN1,1
11 A$="BM128,96U4R4BF4BG2L4"
15 FOR X=20 TO 4 STEP-4
20 DRAW"A3S=X;"+A$
40 DRAW"A1"+A$
60 DRAW"A2"+A$
80 DRAW"A0"+A$
90 FOR Z=1 TO 200: NEXTZ,X
100 GOTO10
```

**Listing 10:**

```
0 '<A5>
10 PMODE4,1:PCLS:SCREEN1,1
15 FOR X=20 TO 4 STEP-4
16 A$="BM128,96U4R4F4G2L4"
20 DRAW"A3S=X;"+A$
40 DRAW"A1"+A$
60 DRAW"A2"+A$
80 DRAW"A0"+A$
90 FOR Z=1 TO 200: NEXTZ,X
100 GOTO10
```

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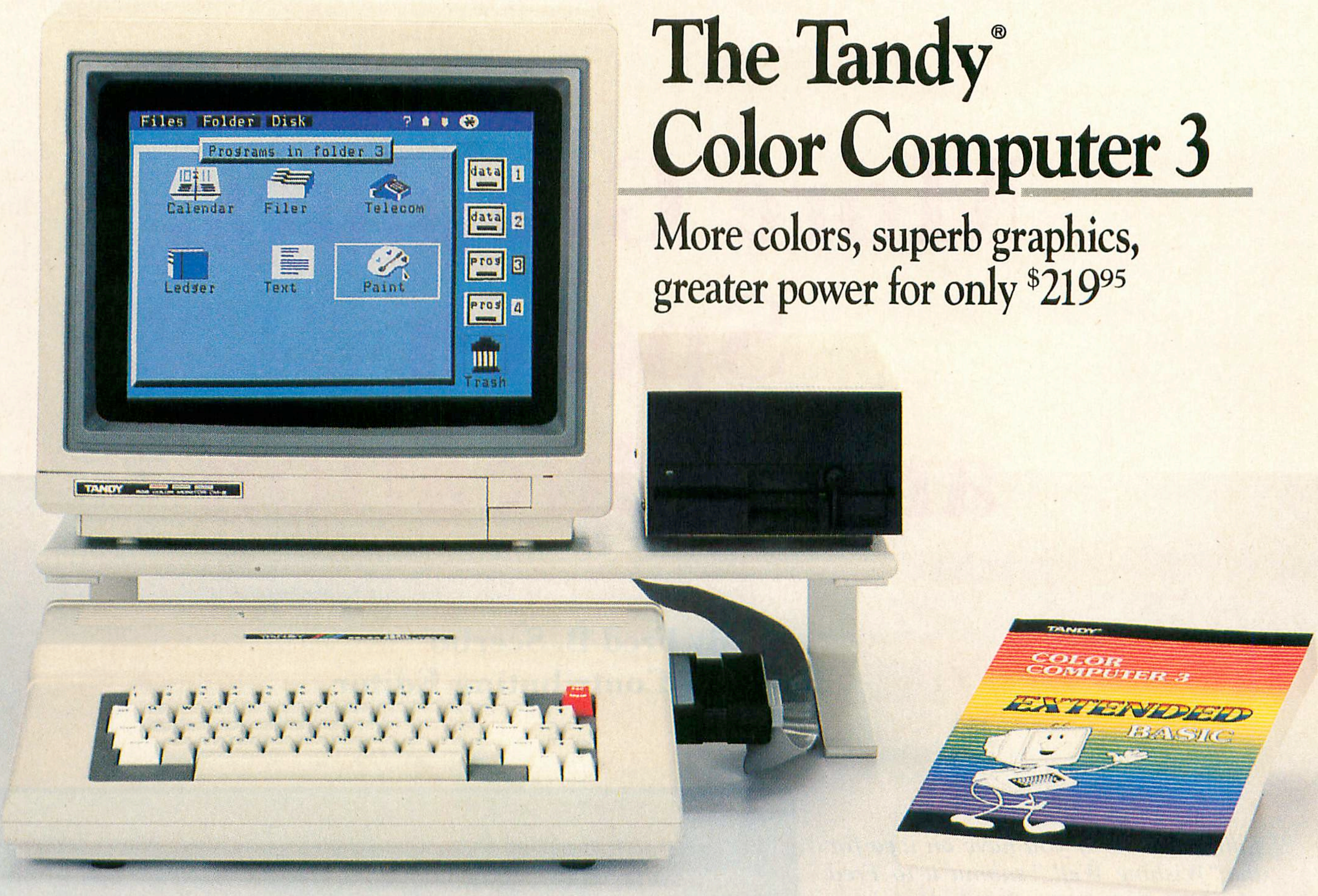

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**32K ECB**

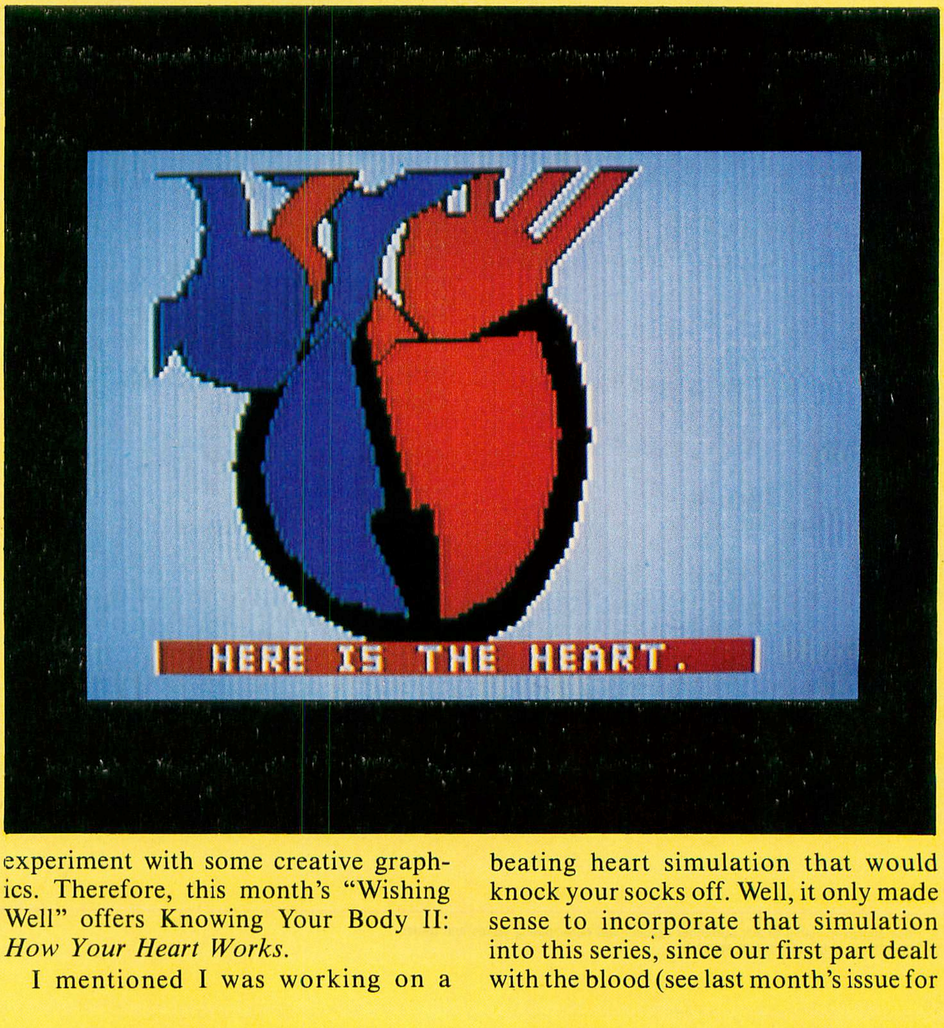
# More Graphics, Speech and Education

### By Fred B. Scerbo
### Rainbow Contributing Editor

*Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget that this is BASIC. All programs resulting from your wishes are for your use, but remain the property of the author.*

Last month we introduced a new series of educational programs called Knowing Your Body. That first program, titled *How Your Blood Works*, combined some classy graphics that you might expect to find in an expensive software package with the added optional bonus of synthetic speech (using Tandy's Speech/Sound Pak). All of these aspects were the result of reader requests for more practical uses of the Speech Pak, for more exciting educational programs, and the strong desire many of you still have to experiment with some creative graphics. Therefore, this month's "Wishing Well" offers Knowing Your Body II: *How Your Heart Works.*

*Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.*



```
HERE IS THE HEART.
```

I mentioned I was working on a beating heart simulation that would knock your socks off. Well, it only made sense to incorporate that simulation into this series, since our first part dealt with the blood (see last month's issue for

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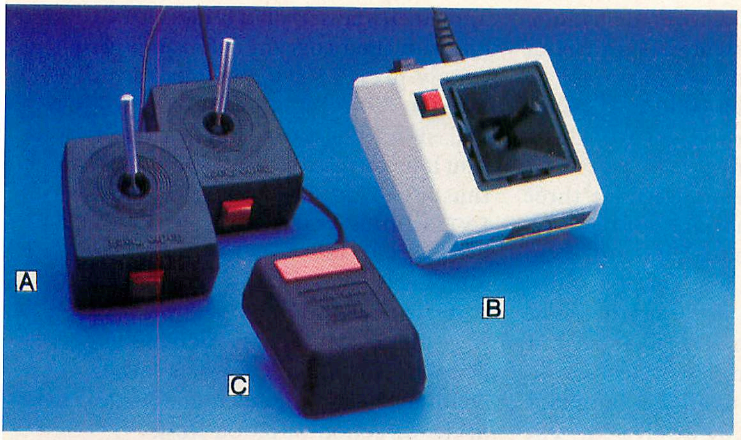
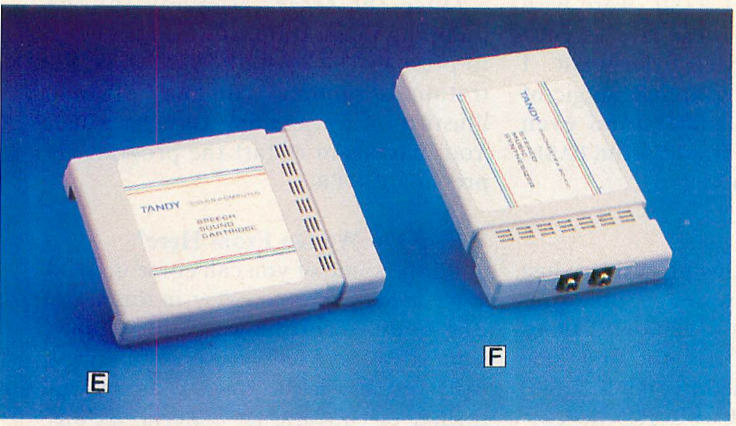


TANDY
MULTI-PAK INTERFACE
D



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G
H

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*Requires 64K, Multi-Pak Interface, floppy disk with controller and OS-9 (2.0 or later). Prices apply at participating Radio Shack Computer Centers and participating Radio Shack stores and dealers. Orchestra-90/TM Software Affair. OS-9/TM Microware Corp.

an in-depth explanation of how these programs work).

*I have* found that large print is usually very effective in presenting material to a student on a computer screen when only a small amount of text is displayed. In fact, several years ago I devised a large text word processor for one of my visually handicapped students that came in quite handy since he had great difficulty using a program like *Color Scripsit*. If enough readers are interested, I may write up a new version of that program, since it is also very useful for small children. Let me know if it is something you would like to see.

When Knowing Your Body was written, I took that large-text concept one step further by creating large-text graphics characters in a combined `PMODE2/PMODE1` graphics mode. This allowed me to draw chunkier letters while using just a fraction of the memory `PMODE4` would take. Also, the lower resolution executes much more quickly.

### Making Movies

I am sure that at some point in your life, you have tried the trick of drawing a *set of* pictures on the pages of a book that you would later flip through to show movement. This is the same technique used to show the beating of our illustrated heart. First, the program will `PCLEAR` eight pages of graphics. When the time comes to draw the beats of our heart, we will use three full screens starting with pages 3 and 4, to pages 5 and 6, and finally pages 7 and 8. These three screens we then alternately `PCOPY` to pages 1 and 2, which are the two pages (one screen) always displayed to the viewer.

As these screens are copied to our viewing screen, the viewer is given the illusion of motion, much like a motion picture. This differs from the technique we used in last month's program. In that program (*Blood*), we showed a white blood cell attacking a foreign invader. That was done by drawing the frame out of the user's view and then copying it to pages 1 and 2. This is an effective means of animation, but would not work well with a pumping heart.

Instead, for our heart we have three separate drawings that are not redrawn each time we see them. They are saved on their own screens and simply copied to view. This allows us to get machine language speed from BASIC, since the `PCOPY` command in Extended Color BASIC is in fact a machine language subroutine in the CoCo's ROM. The authors of Microsoft BASIC were wise enough to include these hooks into machine language speed from BASIC. I haven't yet tried the graphics magic of the CoCo 3, but I understand even greater speed can be milked from BASIC with the new commands.

### Using the Program

The operation of this program is just like last month's offering. Upon running the program, some older CoCos may give a Syntax Error the first time through. This is caused by the `PCLEAR8` problem that later CoCo ROMs corrected. Running the program again will put everything as it should be.

You will next be shown the standard title card, only this time the color settings will be slightly different. You will be asked to choose between talking or not by pressing T or N. This program does not need the Speech Pak by Tandy in order to be viewed. It will not talk, but you can still use it for other purposes, such as reading and viewing the material.

Next, either a red or blue screen will appear. If the screen is blue, press reset and run the program again. If it is red, simply press ENTER to continue. If the Speech Pak is not used, the program will slowly pass through each screen. You may advance to the next screen and thus speed up the program by pressing ENTER after you finish reading a section. The talking mode will advance after each line has been spoken.

At various points in the program, a cross section of the heart will be shown. In each case, an arrow will be inside the chamber being described and will point in the direction of blood flow.

Once the screen is ready for the pumping illustration, you will be asked to press ENTER to start. After the illustration is running, you may exit the illustration by pressing the space bar. You may again restart the program by pressing ENTER.

### Where Do We Go From Here?

I hope some of you can come up with some other topics to cover in this series (the brain, teeth, lungs, etc.). I'll need some ideas on what will be useful topics to cover. It will be easy to adapt this format to educational material on any subject. (Maybe a session on U.S. history, including maps, would be one area to explore.)

Until then, keep your ideas and requests coming. Maybe your suggestion will help open up a whole new world for other CoCo users. ☐

| | | | |
|---|---|---|---|
| 50 | 210 | 450 | 152 |
| 120 | 31 | 495 | 225 |
| 225 | 122 | 520 | 155 |
| 300 | 32 | 570 | 85 |
| 345 | 159 | 600 | 138 |
| 375 | 76 | 670 | 228 |
| 420 | 166 | END | 244 |

**The listing:** `HEART`

```
0 GOTO715
1 REM ***********************
2 REM *  KNOWING YOUR BODY   *
3 REM * HOW YOUR HEART WORKS *
4 REM * A GRAPHIC SIMULATION *
5 REM *   BY FRED B.SCERBO   *
6 REM *    60 HARDING AVE.   *
7 REM * NORTH ADAMS,MA 01247 *
8 REM *  COPYRIGHT (C) 1987  *
9 REM ***********************
10 CLEAR1000:CLS0:PRINTSTRING$(3
2,156);
15 FORI=1TO288:READA:IFA=0THENA=
16
20 PRINTCHR$(A+112);:NEXT
25 PRINTSTRING$(32,147);
30 DATA,93,81,94,,93,91,84,94,85
,92,92,90,93,80,85,,85,88,92,94,
88,84,95,82,93,88,94,92,92,93,,
35 DATA85,93,82,,85,84,91,90,85,
,,90,,90,90,90,90,,,90,,,90,93,8
7,,90,,83,83,,
40 DATA87,,93,82,87,,87,91,85,83
,83,90,,85,,85,,,83,91,82,81,90,
81,95,82,91,83,83,86,80,80
45 DATA18,,18,19,19,18,18,,17,17
,19,19,19,,115,115,115,115,,113,
115,115,115,113,115,115,114,113,
,113,,
50 DATA26,,26,26,,26,26,,21,21,,
,21,,117,,,117,,117,,,117,117,,,
117,117,,117,,
55 DATA26,,26,26,,26,26,,21,21,1
6,,21,,117,,,117,,117,,,117,117,
,,117,117,112,117,,
60 DATA20,22,16,26,,26,26,,21,21
,28,29,28,,117,124,124,124,125,1
17,,,117,117,,,117,,121,120,,
65 DATA,26,,26,,26,26,,21,21,,20
,26,,117,,,,117,117,,,117,117,,,
117,,117,,,
70 DATA,26,,27,19,26,27,19,23,21
,,,29,32,119,115,115,115,119,117
,115,115,119,117,115,115,118,,11
7,,
75 PRINT@389," HOW YOUR HEART WO
RKS ";:PRINT@421," (T)ALKING OR
(N)OT ? ";
80 PRINT@453,"   BY FRED B.SCERB
O   ";
85 PRINT@485,"  COPYRIGHT (C) 19
87  ";
90 X$=INKEY$:IFX$="T"THEN110
95 IFX$="N"THEN105
100 GOTO90
105 NT=1
110 CLS0
115 XX=&HFF00:YY=&HFF7E
120 POKEXX+1,52:POKEXX+3,63
125 POKEXX+35,60
130 PMODE4,1:PCLS1:PMODE4,5:PCLS
1
135 DIMR(23),L$(26),Y(40):C$(1)=
"C1":C$(2)="C2":C$(3)="C3":C$(4)
="C4"
140 FORI=1TO26:READL$(I):NEXT
145 GOTO280
150 AA$=JK$
155 A$=STR$(A):B$=STR$(B)
160 DRAW"BM"+A$+","+B$+C$(CL)
165 IF LEN(JK$)<=21THEN185
170 FOR T=21TO0STEP-1:IF MID$(JK
$,T,1)=" "THEN180
175 NEXT T:GOTO185
180 L$=LEFT$(JK$,T):W$=L$:GOSUB1
90:JK$=" "+RIGHT$(JK$,(LEN(JK$))
-T):GOTO155
185 W$=JK$:B=B+14:GOSUB190:RETUR
N
190 SL=LEN(W$):FORI=1TOSL:BB$=MI
D$(W$,I,1):C=ASC(BB$)-64:IF C=-3
2THEN DRAW"BR12":GOTO210
195 IF C=-18THENDRAW"BR2RBR9":GO
TO210
200 IFC=-20THENDRAW"BR2R2D2G2E4B
R7":GOTO210
205 DRAWL$(C)
210 NEXTI:B=B+14:RETURN
215 PCOPY8TO6:PCOPY8TO7:PMODE2,6
:PMODE1,6:RETURN
220 IFNT=1THEN260
225 FORII=1TOLEN(AA$)
230 IF PEEK(YY)AND 128=0 THEN230
235 POKEYY,ASC(MID$(AA$,II,1))
240 NEXTII
245 IFPEEK(YY)AND128=0THEN245
250 POKEYY,13
255 FORHH=1TO1600:NEXTHH:RETURN
260 FORHH=1TO3000
265 X$=INKEY$:IFX$=CHR$(13)THEN2
75
270 NEXTHH
275 RETURN
280 PMODE2,1:PCLS1:SCREEN1,1:PMO
DE1:SCREEN1,1:PCLS0:POKE65314,24
8
285 GOTO330
290 PMODE2,3:PCLS1:PMODE1,3:PCLS
0
295 CIRCLE(120,98),66,1,1.3,.9,.
3:CIRCLE(110,110),76,1,.9,.27,.5
9:DRAW"BM44,80C1NR8L10U2L8U2L6U2
L4H4U2H2U4G12U22":CIRCLE(0,20),2
2,1,1.4,.75,.25
300 DRAW"BU70R36M+4,+12D8G2":CIR
CLE(40,50),30,1,1,.75,.1:DRAW"BM
62,66ND4M+12,-20U6R2U8R2U14L2U4N
E12G6D6NF6BL20BU4U4R2U4R2E14NR20
L24M+16,+6BR26R4D2R8U2M+14,-6R30
M-36,+20M-6,+8M-8,+30M+20,+70E4R
2F2M+2,+20D22":CIRCLE(120,98),56
,1,1.3,.9,.24
305 DRAW"BL12BU2M-16,-34U4E2R4F2
M-16,-60U6R2U6R4U2NL2U2":CIRCLE(
110,110),66,1,.9,.25,.6:DRAW"BR6
BU10F20U2H10U6L2U14R2U6R2U6BR16B
U8D4F2R6E2U10E6R8M-4,+16F2R2E18R
14G22F4R2E26R14G36D6L2D4M-34,+16
M+30,-4"
310 PAINT(120,176),1,1
315 DRAW"BM52,80C1BE10E16F18E10R
10"
320 DRAW"BM52,80C1E10BU8BR56R14"
:PAINT(40,60),2,1:PAINT(150,52),
3,1:PAINT(150,90),3,1:PAINT(100,
52),3,1:PAINT(86,52),2,1:PAINT(8
6,90),2,1:PAINT(62,26),3,1:PAINT
(56,2),2,1
325 RETURN
330 PCLS3:A=0:B=56:CL=4:JK$=" PR
ESS RESET AND RUN IF SCREEN IS B
LUE.":GOSUB150:B=B+20:JK$=" PRES
S ENTER WHEN THE SCREEN IS RED."
:GOSUB150
```

```
335 X$=INKEY$:IFX$<>CHR$(13)THEN
335
340 PCLS0:R=3:BL=2
345 PMODE2,6:PMODE1,6:COLOR2,3:L
INE(0,0)-(256,48),PRESET,BF:A=0:
B=14:CL=4:JK$=" THE HUMAN HEART
IS ONE OF YOUR MOST IMPORTANT OR
GANS.":GOSUB150:PCOPY6TO1:GOSUB2
20
350 COLOR2,3:LINE(0,54)-(256,92)
,PSET,B:B=70:A=0:CL=1:JK$=" IT I
S A VERY POWERFUL BLOOD PUMP.":G
OSUB150:PCOPY6TO1:GOSUB220
355 COLOR2,3:LINE(0,98)-(256,180
),PSET,BF:B=114:A=0:CL=1:JK$=" I
T IS ABOUT THE SIZE OF YOUR CLOS
ED FIST AND IS JUST TO YOUR LEFT
 OF CENTER INSIDE YOUR RIBS.":GO
SUB150:PCOPY7TO2:GOSUB220
360 GOSUB215
365 COLOR3,2:LINE(0,0)-(256,48),
PRESET,BF:A=0:B=14:CL=4:JK$=" TH
E HEART IS MADE UP OF VERY POWER
FUL MUSCLE TISSUE.":GOSUB150:PCO
PY6TO1:PCOPY7TO2:GOSUB220
370 LINE(0,54)-(256,92),PRESET,B
:B=70:A=0:CL=3:JK$=" THIS MUSCLE
 FORMS FOUR CHAMBERS.":GOSUB150:
PCOPY6TO1:GOSUB220
375 COLOR3,2:LINE(0,98)-(256,192
),PSET,BF:B=114:A=0:CL=1:JK$=" W
HEN THESE CHAMBERS CONTRACT, THE
Y SQUEEZE THE BLOOD INTO THE NEX
T CHAMBER OF YOUR HEART.":GOSUB1
50:PCOPY7TO2:GOSUB220
380 GOSUB215
385 COLOR3,2:LINE(0,0)-(256,48),
PRESET,B:A=0:B=14:CL=1:JK$=" THE
 BLOOD IS THEN SQUEEZED OUT INTO
 ARTERIES AND VEINS.":GOSUB150:P
COPY6TO1:PCOPY7TO2:GOSUB220
390 LINE(0,54)-(256,192),PRESET,
BF:B=70:A=0:CL=4:JK$=" THE ARTER
IES CARRY BLOOD WHICH IS RICH IN
 OXYGEN TO THE CELLS ALL OVER YO
UR BODY. THE VEINS CARRY BLOOD W
HICH HAS CARBON DIOXIDE IN IT BA
CK TO THE LUNGS.":GOSUB150:PCOPY
6TO1:PCOPY7TO2
395 JK$=LEFT$(JK$,121)+" DI OX I
DE IN IT.":GOSUB220:FORI=1TO1200
:NEXT
400 GOSUB215
405 COLOR2,3:LINE(0,0)-(256,48),
PRESET,BF:A=0:B=14:CL=1:JK$=" TH
E HEART HAS TWO UPPER CHAMBERS A
ND TWO LOWER CHAMBERS.":GOSUB150
:PCOPY6TO1:PCOPY7TO2:GOSUB220
410 LINE(0,54)-(256,136),PRESET,
B:B=70:A=0:CL=2:JK$=" THE UPPER
CHAMBERS ARE CALLED AURICLES AND
 THE LOWER CHAMBERS ARE CALLED V
ENTRICLES.":GOSUB150:PCOPY6TO1:P
COPY7TO2:GOSUB220
415 GOSUB290:PCOPY3TO6:PCOPY4TO7
:JK$="  HERE IS THE HEART.":PMOD
E2,6:PMODE1,6:COLOR2,3:LINE(0,17
8)-(256,192),PRESET,BF:A=0:B=188
:CL=4:GOSUB150:PCOPY6TO1:PCOPY7T
O2:GOSUB220
420 GOSUB215
425 COLOR2,3:LINE(0,0)-(256,48),
PRESET,BF:A=0:B=14:CL=1:JK$=" TH
E UPPER LEFT CHAMBER IS CALLED T
HE LEFT AURICLE.":GOSUB150:PCOPY
6TO1:PCOPY7TO2:GOSUB220
430 LINE(0,54)-(256,134),PRESET,
BF:B=70:A=0:CL=4:JK$=" IT PULLS
IN OXYGEN RICH BLOOD FROM THE LU
NGS THEN SQUEEZES IT INTO THE CH
AMBER BELOW.":GOSUB150:PCOPY6TO1
:PCOPY7TO2:GOSUB220:FORI=1TO1200
:NEXT
435 LINE(0,140)-(256,182),PRESET
,B:B=B+4:A=0:CL=3:JK$=" HERE IS
A DIAGRAM OF WHERE IT IS.":GOSUB
150:PCOPY6TO1:PCOPY7TO2:GOSUB220
440 PCOPY3TO6:PCOPY4TO7
445 JK$="  THE LEFT AURICLE.":PM
ODE2,6:PMODE1,6:COLOR2,3:LINE(0,
178)-(256,192),PRESET,BF:A=0:B=1
88:CL=4:GOSUB150:GOSUB450:PCOPY6
TO1:PCOPY7TO2:GOSUB220:FORI=1TO1
200:NEXT:GOTO455
450 DRAW"BM130,30C4D10L4F8E8L4U1
0L8":PAINT(132,32),4,4:RETURN
455 GOSUB215
460 COLOR2,3:LINE(0,0)-(256,48),
PRESET,B:A=0:B=14:CL=1:JK$=" THE
 LOWER LEFT CHAMBER IS CALLED TH
E LEFT VENTRICLE.":GOSUB150:PCOP
Y6TO1:PCOPY7TO2:GOSUB220
465 LINE(0,54)-(256,134),PRESET,
BF:B=70:A=0:CL=1:JK$=" IT PUSHES
 THIS OXYGEN RICH BLOOD UP INTO
THE AORTA, WHICH IS THE LARGEST
ARTERY.":GOSUB150:PCOPY6TO1:PCOP
Y7TO2:GOSUB220
470 LINE(0,140)-(256,182),PRESET
,B:B=B+4:A=0:CL=3:JK$=" HERE IS
A DIAGRAM OF WHERE IT IS.":GOSUB
150:PCOPY6TO1:PCOPY7TO2:GOSUB220
475 PCOPY3TO6:PCOPY4TO7
480 JK$=" THE LEFT VENTRICLE.":P
MODE2,6:PMODE1,6:COLOR2,3:LINE(0
,178)-(256,192),PRESET,BF:A=0:B=
```

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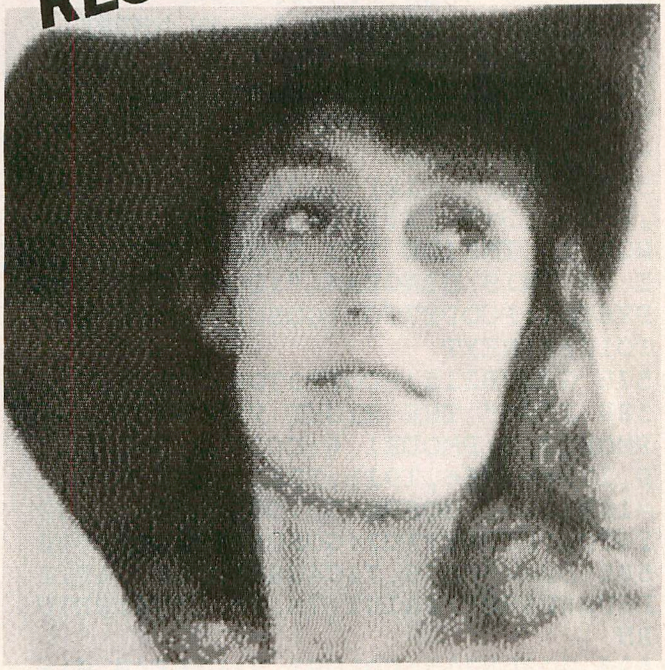

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| | |
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```
188:CL=4:GOSUB150:GOSUB485:PCOPY
6TO1:PCOPY7TO2:GOSUB220:GOTO490:
FORI=1TO1200:NEXT
485 DRAW"BM132,76C4D14H16E4L12D1
2E4F28U30L6":PAINT(134,78),4,4:R
ETURN
490 PCOPY6TO5:PCOPY7TO8:PMODE2,6
:PMODE1,6:PCLS4
495 COLOR2,3:LINE(0,0)-(256,106)
,PRESET,B:A=0:B=14:CL=2:JK$=" IN
 THAT LAST DIAGRAM, THE ARROW WA
S INSIDE THE LEFT VENTRICLE AND
WAS POINTING TO THE AORTA WHICH
IS THE RED ARTERY ABOVE.":GOSUB1
50:PCOPY6TO1:PCOPY7TO2:GOSUB220:
FORI=1TO1200:NEXT
500 COLOR3,2:LINE(0,112)-(256,19
2),PRESET,B:A=0:B=B+12::CL=3:JK$
=" HERE IS THAT DIAGRAM ONCE MOR
E FOR YOU TO LOOK AT.":GOSUB150:
PCOPY6TO1:PCOPY7TO2:GOSUB220
505 PCOPY5TO1:PCOPY8TO2:JK$=" TH
E ARROW IS POINTING TO THE A ORT
A.":GOSUB220
510 PMODE2,6:PMODE1,6:PCLS4:PCOP
Y7TO8
515 COLOR3,2:LINE(0,0)-(256,106)
,PRESET,B:A=0:B=14:CL=3:JK$=" TH
E BLOOD TRAVELS FROM THE AORTA T
O ALL PARTS OF THE BODY, BRINGIN
G OXYGEN TO THE CELLS AND PICKIN
G UP CARBON DIOXIDE.":GOSUB150:P
COPY6TO1:PCOPY7TO2:GOSUB220:FORI
=1TO1200:NEXT
520 LINE(0,112)-(256,192),PRESET
,BF:A=0:B=B+12::CL=4:JK$=" THE B
LOOD THEN GOES BACK TO THE HEART
 THROUGH THE VEINS.":GOSUB150:PC
OPY6TO1:PCOPY7TO2:GOSUB220
525 GOSUB215
530 COLOR1,2:LINE(0,0)-(256,106)
,PSET,BF:A=0:B=14:CL=3:JK$=" THI
S DARKER BLUE COLORED BLOOD EMPT
IES INTO THE RIGHT AURICLE OF TH
E HEART BY WAY OF VEINS CALLED T
HE VENA CAVA.":GOSUB150:PCOPY6TO
1:PCOPY7TO2
535 JK$=LEFT$(JK$,102)+"VEE NA C
AVA":GOSUB220
540 LINE(0,112)-(256,192),PRESET
,B:A=0:B=B+12::CL=2:JK$=" THE AR
ROW IS INSIDE THE RIGHT AURICLE
IN THIS DIAGRAM.":GOSUB150:PCOPY
6TO1:PCOPY7TO2:GOSUB220:FORI=1TO
1200:NEXT
545 GOSUB215:PCOPY3TO6:PCOPY4TO7
550 JK$="  THE RIGHT AURICLE.":P
MODE2,6:PMODE1,6:COLOR2,3:LINE(0
,178)-(256,192),PRESET,BF:A=0:B=
188:CL=4:GOSUB150:GOSUB555:PCOPY
6TO1:PCOPY7TO2:GOSUB220:GOTO560
555 DRAW"BM22,44C4F10G4R18U18G4H
10G8":PAINT(28,44),4,4:RETURN
560 GOSUB215
565 COLOR1,2:LINE(0,0)-(256,106)
,PSET,B:A=0:B=14:CL=2:JK$=" THE
BLOOD IS THEN PUSHED DOWN INTO T
HE RIGHT VENTRICLE BELOW WHERE I
T IS THEN PUSHED UP INTO A LARGE
 VEIN LOCATED ABOVE.":GOSUB150:P
COPY6TO1:PCOPY7TO2:GOSUB220:FORI
=1TO1200:NEXT
570 LINE(0,112)-(256,192),PRESET
,B:A=0:B=B+12::CL=3:JK$=" THE AR
ROW IS INSIDE THE RIGHT VENTRICL
E IN THIS DIAGRAM.":GOSUB150:PCO
PY6TO1:PCOPY7TO2:GOSUB220:FORI=1
TO1200:NEXT
575 GOSUB215:PCOPY3TO6:PCOPY4TO7
580 JK$=" THE RIGHT VENTRICLE.":
PMODE2,6:PMODE1,6:COLOR2,3:LINE(
0,178)-(256,192),PRESET,BF:A=0:B
=188:CL=4:GOSUB150:GOSUB585:PCOP
Y6TO1:PCOPY7TO2:GOSUB220:GOTO590
585 DRAW"BM76,74C4G8R4D16H6G4F12
R6U26R4H8":PAINT(76,78),4,4:RETU
RN
590 GOSUB215:COLOR2,3:LINE(0,0)-
(256,48),PRESET,B:A=0:B=14:CL=1:
JK$=" WE WILL NOW WATCH THE HEAR
T AS IT PUMPS THE BLOOD.":GOSUB1
50:PCOPY6TO1:PCOPY7TO2:GOSUB220
595 LINE(0,54)-(256,134),PRESET,
BF:B=70:A=0:CL=1:JK$=" PRESS THE
```

*Hint . . .*

## Bug-Tracking Lowdown

OK, you typed the long listing in and saved it, but, when you entered RUN, it bombed out. So you go to the line the error message specifies and check it out. It looks all right, but you retype the line anyway. Upon typing RUN, the program dies again in the same place. What is going on? Your CoCo can certainly see a problem that you cannot.

While this is very frustrating, keep in mind most "out of data" (?OD) and function call (?FC) Errors do not occur in the line the computer reports to you. Though the errors are actually located elsewhere, the computer only realized your mistake when it reached the reported line. At this point, you need to check the data lines and string assignments involved in the line in question. For the complete lowdown on these errors, refer to "Escape From the Bug Zone" (January 1987, Page 58).

```
 ENTER KEY TO START THE PUMPING
AND PRESS THE SPACEBAR TO STOP I
T.":GOSUB150:PCOPY6TO1:PCOPY7TO2
:GOSUB220
600 X$=INKEY$:IFX$<>CHR$(13)THEN
600
605 PMODE2,5:PCLS1:PMODE1,5:PCLS
0:POKE65314,248:PCOPY3TO5:PCOPY4
TO6
610 CIRCLE(120,98),58,4,1.3,.9,.
3:CIRCLE(110,110),70,4,.9,.27,.5
9:DRAW"BM44,82C4NR8L10BM+130,-30
E10":PAINT(122,178),4,4
615 CIRCLE(120,94),48,1,1.3,.9,.
3:CIRCLE(110,106),58,1,.9,.27,.5
9:DRAW"BM60,82C1U10":PAINT(104,1
60),1,1:PAINT(126,160),1,1
620 PCOPY5TO7:PCOPY6TO8
625 GOSUB585:GOSUB485
630 PMODE2,7:PMODE1,7:POKE65314,
248:DRAW"BM84,48C4M+8,-26NG8M+3,
+10BL26H10U2E10ND6NL6"
635 PMODE2,3:PMODE1,3:POKE65314,
248:GOSUB555:GOSUB450
640 PMODE2,1:SCREEN1,1:PMODE1,1:
SCREEN1,1:POKE65314,248
645 PCOPY3TO1:PCOPY4TO2
650 FORI=1TO100:NEXTI
655 PCOPY5TO1:PCOPY6TO2
660 FORI=1TO100:NEXTI
665 PCOPY7TO1:PCOPY8TO2
670 FORI=1TO100:NEXTI
675 X$=INKEY$:IFX$=" "THEN685
680 GOTO645
685 PMODE2,6:PMODE1,6:PCLS4
690 B=170:CL=1:JK$=" PRESS ENTER
 TO RETURN TO START.":GOSUB150:P
COPY6TO1:PCOPY7TO2
695 DATA U6E2R2F2D2NL4D4BR6,U8R4
F2G2NL4F2G2NL4BR8,U8R4BD8NL4BR6,
U8R4F2D4G2NL4BR8,U8NR4D4NR4D4R4B
R6,U8NR4D4NR4D4BR10,U8R6BD4NL2D4
NL4BR6,U4NU4R6U4D8BR6
700 DATA R2U8L2R4L2D8R2BR6,NU4R4
U8L4R6BD8BR6,U8D4R2NE4F4BR6,NU8R
4BR6,U8F4E4D8BR6,U8F6NU6D2BR6,U8
R6D8NL6BR6,U8R6D4L6D4BR12,U8R6D8
NL6NH4NF2BR6
705 DATA U8R6D4L4F4BR6,R6U4L6U4R
6BD8BR6,BR4U8L4R8BD8BR6,NU8R6NU8
BR6,BU8D4F4E4U4BD8BR6,NU8R4NU6R4
NU8BR6,E8G4H4F8BR6,BU8D2F4ND2E4U
2BD8BR6,NR8E8NL8BD8BR6
710 IFINKEY$=CHR$(13)THEN RUN EL
SE710
715 PCLEAR8:RUN1
```

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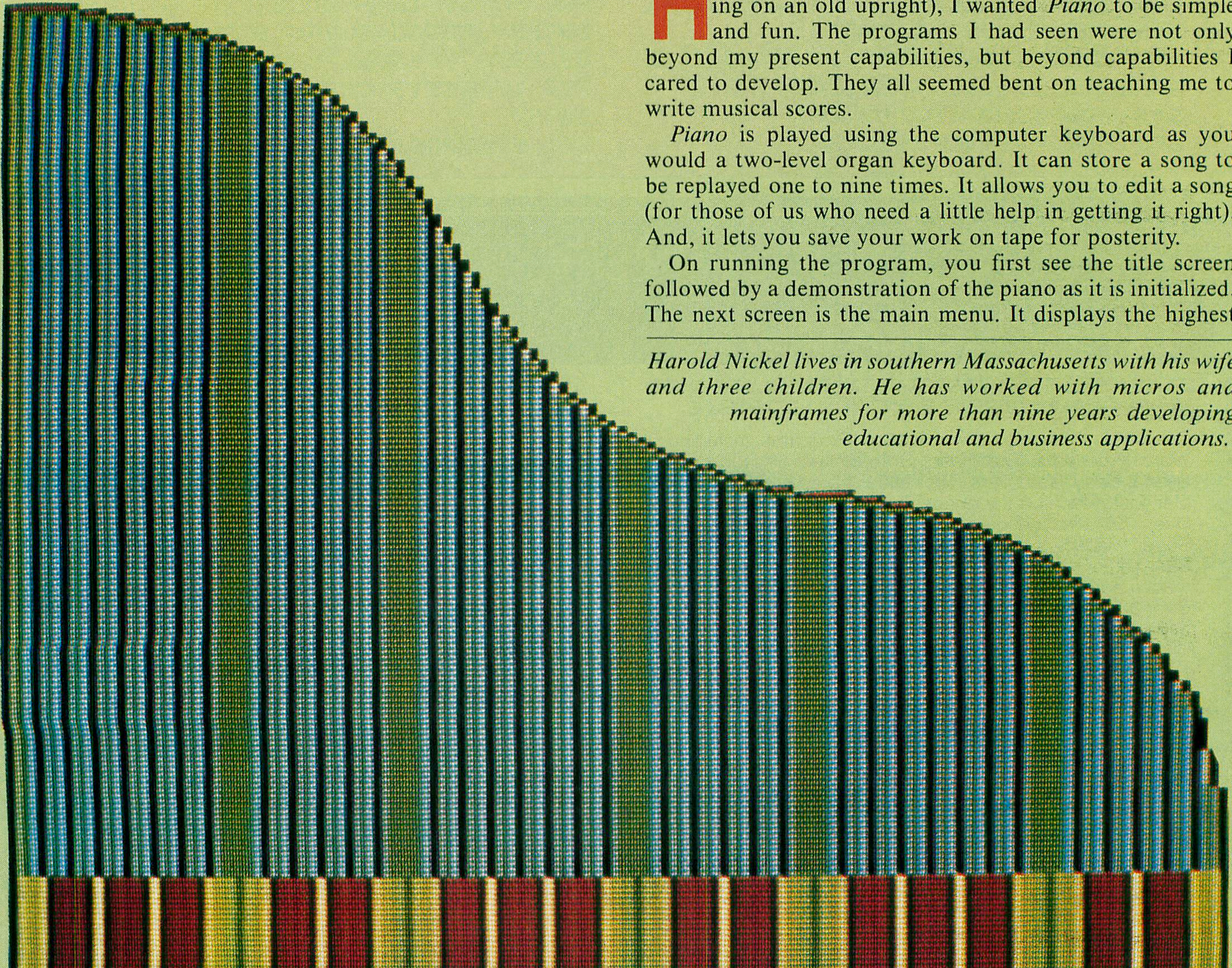
By Harold Nickel



Having little musical background (one summer banging on an old upright), I wanted *Piano* to be simple and fun. The programs I had seen were not only beyond my present capabilities, but beyond capabilities I cared to develop. They all seemed bent on teaching me to write musical scores.

*Piano* is played using the computer keyboard as you would a two-level organ keyboard. It can store a song to be replayed one to nine times. It allows you to edit a song (for those of us who need a little help in getting it right). And, it lets you save your work on tape for posterity.

On running the program, you first see the title screen followed by a demonstration of the piano as it is initialized. The next screen is the main menu. It displays the highest

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level commands: Play, Replay, Edit, Save, Get and Quit. I call these modes.

To select a mode, press the first letter of the mode name. As with most of the commands in this program, you need not use ENTER. The only time you must use ENTER is when a message prompts you for information (such as the song name in the Save mode). Using ENTER at other times will simply be interpreted as an incorrect selection.

There are two ways to move between modes. You can use the ? to return to the main menu and make a new selection. Or you can use the = followed by the letter of the mode you want. The second method bypasses the menu display.

Besides modes, you will notice ?, *, SHIFT / CLEAR, and SPACE listed on the main menu. These are the most commonly used second level commands, or options. They are included as a quick reference aid but are not active while the menu is displayed.

**Screens**

Each mode can be identified by its particular screen. There are two kinds of screens: text and graphics. Text screens are used to prompt for messages and vary between modes. The graphics screen is the one you see demonstrated on first running *Piano*. It displays a baby grand piano as its main feature (Figure 1).

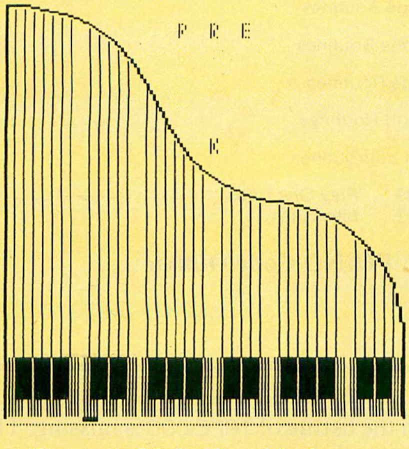

**Figure 1: Main Graphic Screen**

The text screens are used in the Save, Get, Quit and Edit modes. Save and Get messages prompt you to enter song names. Quit displays a sign-off message and then ends the program. While Edit mode does not use the text screen for its main screen, it does use it for an option.

The basic graphics screen is used in the Play, Replay and Edit modes. Besides the piano, it displays four letters (P, R, E and K) clustered in the upper-middle and has two lines at the bottom. The four letters are circled to indicate active options. The first three are for the Play, Replay, or Edit modes, respectively. The K is for the Keep option. When active, *Piano* stores the notes you play in memory. Keep is toggled on and off using the * in either the Play or Edit modes.

The two lines below the piano are also indicators. The short line directly below the fifth white key from the left marks middle C. The long line below it is a storage indicator. It shows the amount of space still available to keep notes. (*Piano* has room for over 2,500 notes.) As you play notes with the Keep option on, this line will change color from left to right. It is also used in the Replay and Edit modes to mark the currently active note.

**Modes and Options**

In the Play mode, you use the computer's keyboard as piano keys. The top and third rows control the black notes. The second and bottom rows control the white notes. The space bar is used to insert a pause, or rest, for the length of one note so you can add meter to your songs. You will notice that not all the keys in the top and third rows correspond to a black note. This reflects the notes missing from a piano keyboard, such as B#.

There are two options available in the Play mode: Keep and Clear. With Keep on (set with the *) any valid note you play, including rests, will be added to the end of the song currently stored. The Clear option erases any song currently stored. To use Clear, hold down the SHIFT key and push CLEAR.

In Replay mode, the song currently stored will be played back to you. Pressing a number from 1 to 9 will play the song that number of times. Other keys, except ? and =, will play it once. Using the space bar will pause playing until you once again press a key.

The Save mode lets you record your song on tape. Using a text screen, you can enter the name of the song. The name can be any combination of eight characters, except ? or =. You can also specify a song already on tape for the new song to be positioned after. If you do not enter an "after" name, the song will be saved at the current tape position. In either case, you will be prompted when to set the recorder to play and record.

Get uses a text screen to request the name of a song to retrieve from tape. It will also prompt you to set your recorder to play. The song gotten from tape will replace any song currently stored.

Quit displays an exit message and ends the program. Once you quit *Piano*, you must run it from the beginning to play again. Any song not on tape is lost.

**The Edit Mode**

The Edit mode uses a variation on the basic graphics screen (Figure 2). Because you must point to the position of one particular note while editing, a second storage scale has been added on the right of the screen. This scale magnifies portions of the storage indicator in groups of one hundred notes (about one key's width on the bottom scale). As you move through the song in Edit, the bottom scale shows the general location and the side scale the exact note in the group. When you go beyond the last note in the current group, it will be replaced by the next group of one hundred.

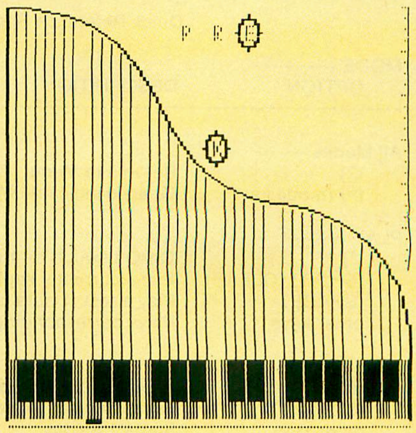

**Figure 2: Edit Graphic Screen**

There are two ways to move to a note in Edit. You can move one note at a time, or you can move directly to the note. To move one note at a time, hold down the left or right arrow key. Each note will play in the order indicated by the arrow used until the key is released. This method also provides wraparound; that is, with the right arrow, the first note follows the last and with the left arrow, the last follows the first.

To go directly to a note, use the # sign. A text screen will let you enter the note's number. If that note exists, you will be moved directly there. If not, an error message is displayed. Entering no number returns you to the graphics screen with no change in position.

Once you are positioned at a note, you can change it, erase it, or add a new note after it. You change a note by turning the Keep option on (using the *) and playing the new note. The current note is replaced and you are moved to the next note. Without Keep on, playing notes will not affect stored notes. This way you can practice before changing or adding notes.

Erasing notes is done with the down arrow. Using the down arrow alone erases one note. Holding down the SHIFT and pushing the down arrow erases all notes from the current position to the end of the song.

To add a note, use the up arrow and follow it with a valid note key. The note will be added after the current position. As with the down arrow, you can use the up arrow with the SHIFT key. In this case, all valid notes will be added until the up arrow is pressed again (similar to how CAPS LOCK works on a typewriter).

I had fun writing *Piano*, and I enjoy playing with it, even though others sometimes have difficulty guessing what songs I'm playing. To assist in using this program, I have included a Quick Reference Guide to the commands (Figure 3). For those who want to analyze the code, I have also included an outline of the program routines in Figure 4. I hope *Piano* provides you with as much enjoyment as it has me. ☐

Quick Reference Sheet

| MODE ------------<br>OPTION | DESCRIPTION |
|---|---|
| All Modes ------- | |
| (?) | Returns to Menu |
| (=) (mode key) | Goes to indicated Mode |
| PLAY ------------ | |
| (*) | On/Off switch for Keep |
| (SHIFT) (CLEAR) | Erase currently kept song |
| (SPACE) | Play a rest (1 note pause) |
| other keys | Plays corresponding notes |
| REPLAY --------- | |
| (0) to (9) | Replays song the selected times |
| (SPACE) | Pauses Replaying (any key restarts) |
| other keys | Starts 1 Replay |
| EDIT ------------ | |
| (#) | Select current note number |
| right arrow | Move note pointer forward |
| left arrow | Move note pointer backward |
| up arrow | Insert 1 note after current |
| (SHIFT) up | Insert until up arrow pushed |
| down arrow | Erase current note |
| (SHIFT) down | Erase from current to end of song |
| (*) | On/Off switch for Keep |
| valid note key<br>or (SPACE) | If Keep On, replace current note and move pointer to next note |
| SAVE ------------ | |
| name (ENTER) | 1-8 character name for song |
| 'AFTER' name | Name of song it will follow |
| GET ------------- | |
| name (ENTER) | 1-8 character name of song |
| QUIT ------------ | Exits PIANO |

**Figure 3: PIANO Commands**

| Lines | Description | |
|---|---|---|
| 001 | Program Name | |
| 002-009 | Display Title Screen | |
| 010-017 | Reserve Memory | |
| | 010 | Reserve Graphics Area |
| | 011-017 | Initialize Variables |
| 020-054 | Store Table Values | |
| | 020-022 | Piano String Lengths |
| | 030-032 | Color of Piano Keys |
| | 040-042 | Piano Key Note Values |
| | 050-054 | Piano Key to Keyboard Key Relationships |
| 060-088 | Draw Piano Graphics Screen | |
| | 060-064 | Outline the Piano |
| | 070-074 | Draw and Play White Keys |
| | 075-079 | Draw Mode Letters |
| | 080-084 | Draw and Play Black Keys |
| | 085-088 | Draw Middle 'C' and Note Storage Lines |
| 090-091 | Reset Note Duration from Demo to Normal Length | |
| 100-136 | Display Main Menu | |
| 150-199 | Get and Process Mode Selection | |
| 200-242 | PLAY Mode Routines | |
| 300-341 | REPLAY Mode Routines | |
| 400-497 | EDIT Mode Routines | |
| 500-545 | SAVE Mode Routines | |
| 600-625 | GET Mode Routines | |
| 900-960 | QUIT (Exit) Routines | |
| 1000-1123 | Common Subroutines | |
| | 1000-1099 | Play One Note |
| | 1100-1123 | Messages |

**Figure 4: PIANO Code Outline**

# CORRECTIONS

**"Tracking the Tempest"** (April 1987, Page 26): H.G. Williamson wrote to warn us of an error in the review section of *Hurricane Tracker*. Line 485 contains an incorrect reference to the cell (N,2) of the D$ array. The corrected line appears below.

```
485 PRINTD$(N,0)TAB(6)D$(N,1);TA
B(11)D$(N,2);TAB(17)D$(N,3);TAB(
22)D$(N,4);TAB(27)D$(N,5)
```

**"The Tournament Master"** (April 1987, Page 120): Richard Steinbrueck tells us of an error in his program, RNDROBIN. To correct the problem, first retype Line 50, but number it as Line 507. Then delete the original Line 50. This will correct a problem with the TAB function, which occurred if the summary sheet was printed before the competition assignment sheets.

**"Fast Relief for Tape-Loading Headaches"** (February 1987, Page 182): Due to a production error, part of Line 82 in the listing of TAPE DOC is missing. The entire line appears below.

```
82 DATA 9F,76,9E,F3,86,9F,A7,80,
9F,F3,9E,76,39:FORX=0 TO 12:READ
 R$:POKE&H9F00+X,(VAL("&H"+R$)):
NEXT:'routine to put white squar
e
```

**For quicker reference, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type** DATA **at the CoCo SIG> prompt and** INFO **at the TOPIC> prompt.**

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| | | | |
|---|---|---|---|
| 41 | 147 | 443 | 169 |
| 73 | 236 | 491 | 233 |
| 100 | 158 | 523 | 85 |
| 162 | 12 | 620 | 225 |
| 310 | 149 | 1000 | 92 |
| 410 | 10 | END | 131 |
| 425 | 68 | | |

**The listing:** PIANO

```
1 'PIANO
2 CLS:PRINT@203,"P I A N O":PRIN
T@235,"---------":PRINT@335,"BY"
:PRINT@363,"H. NICKEL"
10 PCLEAR 4
11 DIM L(41),C(41),N(41),K(122),
NS(2520)
12 DIM I$(0),F$(0),S$(0)
13 DIM KF(0),LP(0),CP(0),XP(0)
14 DIM I(0),S(0),T(0),X(0),Y(0)
15 NS(0)=0
16 KF=1:LP=0:CP=0:XP=0
17 S=0:T=1
20 'SET STRING LENGTHS
21 DATA 3,3,4,5,6,7,8,10,12,15,1
8,22,27,33,40,48,56,63,69,74,78,
81,84,86,88,90,91,92,92,93,94,95
,97,99,101,104,108,112,117,123,1
30
22 FOR I=1 TO 41:READ S:L(I)=S:N
EXT
30 'SET KEY COLORS
31 DATA2,4,2,4,2,4,2,0,2,4,2,4,2
,0,2,4,2,4,2,4,2,0,2,4,2,4,2,0,2
,4,2,4,2,4,2,0,2,4,2,4,2
32 FOR I=1 TO 41:READ S:C(I)=S:N
EXT
40 'SET KEY NOTES
41 DATA5,19,32,45,58,69,78,0,89,
99,108,117,125,0,133,140,147,153
,159,165,170,0,176,180,185,189,1
93,0,197,200,204,207,210,213,216
,0,218,221,223,225,227
42 FOR I=1 TO 41:READ S:N(I)=S:N
EXT
50 'SET KEYBOARD/KEY RELATIONSHI
PS
51 DATA 37,100,39,41,18,100,2,4,
6,100,10,12,100,16,20,40,100,100
,100,100,21,100,31,27,26,5,100,3
0,32,15,34,100,38,35,33,17,19,1,
7,24,9,13,29,3,25,11,23
52 FOR I=1 TO 122:K(I)=100:NEXT
53 FOR I=44 TO 90:READ S:K(I)=S:
NEXT
54 K(32)=0
60 'OUTLINE PIANO
61 PMODE 3,1:PCLS:SCREEN 1,0
```

```
62 LINE(2,188)-(2,1),PSET:LINE -
(4,1),PSET
63 FOR I=1 TO 41:LINE -((I*6)+2,
L(I)-2),PSET:NEXT
64 LINE -(254,148),PSET:LINE -(2
54,188),PSET
70 'DRAW WHITE KEYS
71 COLOR 2,3
72 FOR I=1 TO 41 STEP 2
73 LINE((I*6)-2,161)-((I*6)+6,18
7),PSET,BF:GOSUB 1001
74 NEXT
75 'DRAW MODE LETTERS
76 LINE(112,10)-(112,16),PSET:LI
NE(114,10)-(116,12),PSET:LINE(11
6,12)-(114,14),PSET
77 LINE(132,10)-(132,16),PSET:LI
NE(134,10)-(136,12),PSET:LINE(13
6,12)-(134,14),PSET:LINE(132,13)
-(136,16),PSET
78 LINE(152,10)-(152,16),PSET:LI
NE(152,10)-(156,10),PSET:LINE(15
2,13)-(156,13),PSET:LINE(152,16)
-(156,16),PSET
79 LINE(132,62)-(132,68),PSET:LI
NE(134,65)-(136,62),PSET:LINE(13
4,65)-(136,68),PSET
80 'DRAW BLACK KEYS
81 COLOR 4,3
82 FOR I=2 TO 40 STEP 2
83 IF C(I)=0 THEN GOTO 84 ELSE L
INE((I*6)-2,161)-((I*6)+6,179),P
SET,BF:GOSUB 1001
84 NEXT
85 'UNDERLINE MIDDLE C
86 LINE(52,188)-(60,188),PSET:LI
NE(52,189)-(60,189),PSET
87 'DRAW STORAGE LINE INDICATOR
88 LINE(4,191)-(255,191),PRESET
90 'SET NOTE LENGTH
91 T=3
100 'PRINT MENU
101 CLS:SCREEN 0,1
110 PRINT"                 MENU"
111 PRINT"                 ----"
112 PRINT
120 PRINT"       P - PLAY PIANO"
121 PRINT"       R - REPLAY THE S
ONG"
122 PRINT"       E - EDIT THE SON
G"
123 PRINT"       S - SAVE A SONG
ON TAPE"
124 PRINT"       G - GET A SONG F
ROM TAPE"
130 PRINT
131 PRINT"       Q - QUIT PLAYING
"
```

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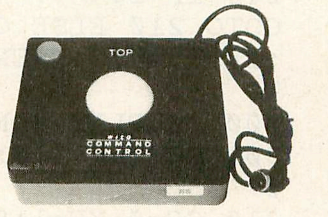

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```
132 PRINT"    ? - MENU"
133 PRINT
134 PRINT" (SHIFT)(*)     - KEEP
 SWITCH"
135 PRINT" (SHIFT)(CLEAR) - ERAS
E NOTES"
136 PRINT" (   SPACE    ) - PAUS
E / REST"
150 I$=INKEY$:IF I$="" THEN GOTO
 150
160 IF I$="P" THEN GOTO 201
161 IF I$="R" THEN GOTO 301
162 IF I$="E" THEN GOTO 401
163 IF I$="S" THEN GOTO 501
164 IF I$="G" THEN GOTO 601
165 IF I$="Q" THEN GOTO 901
166 IF I$="?" THEN GOTO 101
167 IF I$="M" THEN GOTO 101
199 GOTO 150
200 'PLAY PIANO
201 SCREEN 1,0:CIRCLE (114,13),9
,0
210 I$=INKEY$:IF I$="" THEN GOTO
 210
220 I=K(ASC(I$))
221 IF I<100 THEN GOSUB 1001 ELS
E GOTO 240
230 IF KF=0 THEN IF LP=2520 THEN
 GOSUB 1121 ELSE PSET(INT(LP/10)
+4,191,2):LP=LP+1:NS(LP)=I
231 GOTO 210
240 IF I$="*" THEN KF=(KF+1)-(2*
KF):CIRCLE(134,65),9,KF:GOTO 210
241 IF ASC(I$)=92 THEN LP=0:CP=0
:LINE(4,191)-(255,191),PRESET:GO
TO 210
242 IF I$<>"?" AND I$<>"=" THEN
GOTO 210 ELSE CIRCLE(114,13),9,1
:IF I$="?" THEN GOTO 101 ELSE GO
TO 150
300 'REPLAY SONG
301 SCREEN 1,0:CIRCLE(134,13),9,
0
310 CP=0:XP=1:S=1
320 I$=INKEY$:IF I$="" THEN GOTO
 320
321 IF I$>"/" THEN IF I$<":" THE
N S=VAL(I$)
322 IF I$="?" OR I$="=" THEN CIR
CLE(134,13),9,1:IF I$="?" THEN G
OTO 101 ELSE GOTO 150
330 IF XP>S THEN GOTO 310
331 IF CP<LP THEN PSET(INT(CP/10
)+4,191,4) ELSE XP=XP+1:CP=0:GOT
O 340
332 CP=CP+1:I=NS(CP):GOSUB 1001:
PSET(INT((CP-1)/10)+4,191,2)
340 I$=INKEY$:IF I$="" THEN GOTO
 330
341 IF I$=" " THEN GOTO 320 ELSE
 GOTO 321
400 'EDIT SONG
401 SCREEN 1,0:CIRCLE(154,13),9,
0
402 LINE(254,1)-(254,120),PRESET
:FOR S=1 TO 101 STEP 20:LINE(250
,S)-(252,S),PRESET:PSET(252,S+5,
3):PSET(252,S+10,3):PSET(252,S+1
5,3):NEXT
403 XP=1:IF CP>0 THEN GOSUB 490
ELSE IF LP>0 THEN CP=1:GOSUB 490
410 I$=INKEY$:IF I$="" THEN GOTO
 410
411 IF I$="#" THEN IF LP=0 THEN
GOTO 495 ELSE GOTO 420
412 IF ASC(I$)=8 OR ASC(I$)=9 TH
EN IF LP=0 THEN GOTO 495 ELSE S=
335+ASC(I$):GOTO 430
413 IF I$="*" THEN KF=(KF+1)-(2*
KF):CIRCLE(134,65),9,KF:GOTO 410
414 IF ASC(I$)=10 THEN IF LP>0 T
HEN GOTO 440 ELSE GOTO 495
415 IF ASC(I$)=91 THEN IF LP>0 T
HEN GOTO 450 ELSE GOTO 495
416 IF ASC(I$)=94 THEN GOSUB 470
:GOTO 410
417 IF ASC(I$)=95 THEN GOSUB 460
:GOTO 410
418 I=K(ASC(I$)):IF I<100 THEN I
F KF=0 THEN GOTO 480 ELSE GOSUB
1001
419 IF I$<>"?" AND I$<>"=" THEN
GOTO 410 ELSE COLOR 1,3:LINE(250
,1)-(254,120),PSET,BF:CIRCLE(154
,13),9,1:IF I$="?" THEN GOTO 101
 ELSE GOTO 150
420 CLS
421 PRINT@160,"":INPUT"ENTER THE
 NOTE NUMBER";I$
422 IF I$<>"" THEN X=0 ELSE SCRE
EN 1,0:GOTO 410
423 FOR S=0 TO LEN(I$)-1
424 IF ASC(RIGHT$(I$,LEN(I$)-S))
<48 OR ASC(RIGHT$(I$,LEN(I$)-S))
>57 THEN X=1
425 NEXT
426 IF X=1 THEN GOTO 428 ELSE IF
 VAL(I$)>LP THEN GOTO 428 ELSE C
P=VAL(I$):SCREEN 1,0:IF CP=0 THE
N PSET(254,XP,3):GOTO 410
427 GOSUB 490:GOTO 410
428 CLS:PRINT@256,"*************
******************":PRINT"*NUMBE
RS MUST BE FROM 0 TO";LP:PRINT@3
```

```
18,"*":PRINT"*******************
************"
429 SOUND 5,5:GOTO 421
430 IF CP=0 THEN CP=1
431 GOSUB 490
432 IF PEEK(S)<>247 THEN GOTO 41
0
433 IF S=343 THEN CP=CP-1:IF CP<
1 THEN CP=LP
434 IF S=344 THEN CP=CP+1:IF CP>
LP THEN CP=1
435 GOTO 431
440 IF CP=0 THEN GOTO 410 ELSE I
F CP=LP THEN GOTO 450
441 FOR S=CP+1 TO LP:NS(S-1)=NS(
S):NEXT:LP=LP-1
442 IF INT((LP-1)/10)<INT(LP/10)
 THEN PSET(INT(LP/10)+4,191,3)
443 GOSUB 490
444 GOTO 410
450 IF CP=0 THEN LP=CP ELSE CP=C
P-1:LP=CP
451 IF LP<1 THEN LINE(4,191)-(25
5,191),PRESET ELSE IF LP<2501 TH
EN LINE(INT((LP-1)/10)+4,191)-(2
55,191),PRESET
452 IF LP>0 THEN GOSUB 490 ELSE
PSET(254,120,3)
453 GOTO 410
460 GOSUB 470
461 IF ASC(I$)=94 THEN RETURN EL
SE GOTO 460
470 I$=INKEY$:IF I$="" THEN GOTO
 470 ELSE IF K(ASC(I$))>99 THEN
RETURN
471 CP=CP+1:LP=LP+1
472 IF CP<LP THEN FOR S=LP TO CP
+1 STEP -1:NS(S)=NS(S-1):NEXT
473 NS(CP)=K(ASC(I$)):PSET(INT((
LP-1)/10)+4,191,2):GOSUB 490
474 RETURN
480 IF CP>0 THEN NS(CP)=K(ASC(I$
)):GOSUB 490
481 CP=CP+1:IF CP>LP THEN CP=1
482 PSET(254,XP,3):XP=121-(CP-(I
NT((CP-1)/120)*120)):PSET(254,XP
,2)
483 GOTO 410
490 PSET(254,XP,3):XP=121-(CP-(I
NT((CP-1)/120)*120)):IF CP>0 THE
N PSET(254,XP,2)
491 PSET(INT((CP-1)/10)+4,191,3)
:I=NS(CP):GOSUB 1001:PSET(INT((C
P-1)/10)+4,191,2)
492 RETURN
495 CLS:PRINT@192,"*************
```

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```
******************":PRINT"* NO N
OTES ARE CURRENTLY KEPT *":PRINT
"*******************************
"
496 SOUND 200,10:FOR S=1 TO 1000
:NEXT
497 SCREEN 1,0:GOTO 410
500 'SAVE SONG
501 CLS
510 PRINT@160,"":INPUT"SAVE AS W
HAT NAME";F$
511 IF F$="=" THEN GOTO 150 ELSE
 IF F$="?" THEN GOTO 101 ELSE IF
 F$="" THEN GOTO 101
512 IF LEN(F$)>8 THEN CLS:GOSUB
1111:GOTO 510
520 CLS
521 PRINT@160,"":INPUT"SAVE afte
r WHAT SONG";S$
522 IF S$="=" THEN GOTO 150 ELSE
 IF S$="?" THEN GOTO 101 ELSE IF
 S$="" THEN GOTO 540
523 IF LEN(S$)>8 THEN CLS:GOSUB
1111:GOTO 521
530 CLS:I$=" play ":GOSUB 1101
531 I$=INKEY$:IF I$="" THEN GOTO
 531 ELSE IF I$="?" THEN GOTO 10
1 ELSE IF I$="=" THEN GOTO 150 E
LSE IF ASC(I$)<>13 THEN GOTO 531
532 PRINT@296,"skipping ";S$:SKI
PF S$
540 CLS:I$="record":GOSUB 1101
541 I$=INKEY$:IF I$="" THEN GOTO
 541 ELSE IF I$="=" THEN GOTO 15
0 ELSE IF I$="?" THEN GOTO 101 E
LSE IF ASC(I$)<>13 THEN GOTO 541
542 PRINT@297,"SAVING ";F$:OPEN"
O",-1,F$:PRINT@297,"saving ";F$:
IF LP<1 THEN GOTO 544
543 FOR S=1 TO LP:PRINT#-1,NS(S)
:NEXT S
544 CLOSE-1:CLS:PRINT@137,F$;" s
aved.":PRINT:PRINT"    *********
**************":PRINT"    * PUSH
 ? FOR THE MENU *":PRINT"    ***
********************"
545 I$=INKEY$:IF I$="=" THEN GOT
O 150 ELSE IF I$="?" THEN GOTO 1
01 ELSE GOTO 545
600 'GET SONG
601 CLS:S$="NEXT SONG"
610 PRINT@160,"":INPUT"GET WHAT
SONG";F$
611 IF F$="=" THEN GOTO 150 ELSE
 IF F$="?" THEN GOTO 101 ELSE IF
 F$="" THEN GOTO 620 ELSE S$=F$
612 IF LEN(F$)>8 THEN CLS:GOSUB
1111:GOTO 610
```

## About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

*Here are the guidelines:* The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry
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```
620 CLS:I$=" play ":GOSUB 1101
621 I$=INKEY$:IF I$="" THEN GOTO
 621 ELSE IF I$="?" THEN GOTO 10
1 ELSE IF I$="=" THEN GOTO 150 E
LSE IF ASC(I$)<>13 THEN GOTO 621
622 PRINT@293,"searching for ";S
$:OPEN"I",-1,F$:PRINT@293,"   ge
tting ";S$:CP=0:LP=0:COLOR 2,3:L
INE(4,191)-(255,191),PRESET
623 LP=LP+1:INPUT#-1,NS(LP):IF E
OF(-1) THEN GOTO 624 ELSE GOTO 6
23
624 CLOSE-1:CLS:PRINT@137,S$;" g
otten.":PRINT:PRINT"    ********
***************":PRINT"    * PUS
H ? FOR THE MENU *":PRINT"     **
*********************":IF LP>0 T
HEN LINE(4,191)-(INT((LP-1)/10)+
4,191),PSET
625 I$=INKEY$:IF I$="?" THEN GOT
O 101 ELSE IF I$="=" THEN GOTO 1
50 ELSE GOTO 625
900 'QUIT SCREEN
901 CLS:SCREEN 0,1
910 PRINT@200,"GOOBYE, FOR NOW."
920 PRINT@257,"I HOPE YOU ENJOYE
D PLAYING THE"
930 PRINT@331,"P I A N O."
940 PRINT@363,"----------"
950 PRINT@448,""
960 END
1000 'PLAY ONE NOTE
1001 IF I=0 THEN FOR X=1 TO 160:
NEXT X:RETURN
1010 LET X=I*6:IF C(I)=2 THEN LE
T Y=187 ELSE LET Y=179
1020 LINE(X-2,Y-6)-(X+6,Y),PRESE
T,BF:COLOR2,3:LINE(X+2,160)-(X+2
,L(I)),PSET
1030 SOUND N(I),T
1040 LINE(X+2,160)-(X+2,L(I)),PR
ESET:COLOR C(I),3:LINE(X-2,Y-6)-
(X+6,Y),PSET,BF
1099 RETURN
1100 'MESSAGES
1101 CLS:PRINT@128,"************
********************":PRINT"*SET
RECORDER TO ";I$;" & PUSH*"
1102 PRINT"* enter TO BEGIN (? F
OR MENU) *":PRINT"**************
****************"
1103 RETURN
1111 PRINT@257,"****************
*************":PRINT" * NAMES MU
ST BE 1-8 SYMBOLS *":PRINT" ****
****************************"
1112 SOUND 5,5:RETURN
1121 CLS:PRINT@192,"************
*******************":PRINT"* SPA
CE FOR KEPT NOTES IS full*":PRIN
T"******************************
*"
1122 SOUND 200,10:FOR S=1 TO 100
0:NEXT
1123 SCREEN 1,0:RETURN
```

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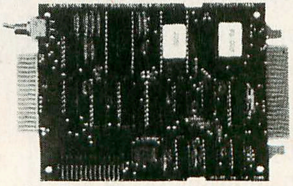

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# PIPELINE

**IT'S HERE!** Radio Shack announced March 9, 1987, the availability of OS-9™ Level II, the user-friendly operating system for the Color Computer 3. The OS-9 Level II package includes BASIC09™ and several utilities. The operating system features windowing and graphics in addition to the multi-user, multitasking environment. It also features a powerful memory management system with memory protection inherent in its operation and affords a high-level of system I/Os, including file and record locking. *Available at all Radio Shack stores, Radio Shack Computer Centers and participating dealers nationwide, suggested retail price of OS-9 Level II (Catalog No. 26-3031) is $79.95.*

**UP, UP AND AWAY** Tandy Corporation announced that consolidated sales and operating revenues for the month of February were $244,449,000 — an increase of 12 percent over the February 1986 sales and operating revenues of $218,103,000. Tandy's U.S. retail operations recorded a 15 percent jump in sales and operating revenues to $210,737,000 in February 1987 from $183,567,000 in February 1986. Sales and operating revenues of U.S. retail stores in existence more than one year increased 13 percent in February 1987.

**TEACH AN OLD DOG NEW TRICKS** To meet the needs of new niche markets, C. Itoh Digital Products, Inc., has added more speed, memory and faster throughput to its popular ProWriter jr. dot matrix printer.

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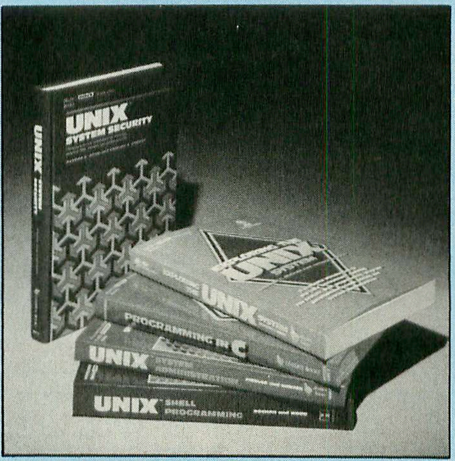
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**GET AN EDUCATION** The Hayden Books UNIX System Library is a series of books on various topics related to the UNIX system. This acclaimed series covers everything from introductory texts, such as *Programming in C* and *Exploring the UNIX System*, to more advanced titles such as *UNIX Text Processing* and *UNIX Shell Programming*. The books were edited by Stephen G. Kochan and Patrick H. Wood, who specialize in training UNIX and C users. They worked for several years at Bell Laboratories teaching introductory and advanced courses.

Hayden Books UNIX Library was recently aquired by Howard W. Sams & Company, a division of Macmillan, Inc. *The UNIX Library and other titles from Hayden Books are available through bookstores, electronics distributors or by calling Howard W. Sams at (800) 428-SAMS.*

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# Help One, Help All

### By Cray Augsburg
### Rainbow Technical Editor

Last month in "Delphi Bureau," we discussed several ways in which users of the CoCo SIG could find help on SIG operation. This month, we will turn to a related topic of how CoCo SIG members can help themselves, as well as the rest of the CoCo Community.

Three sections of the CoCo SIG exist for the purpose of allowing users to boost growth in the CoCo Community. These sections, as they appear on the CoCo SIG menu, are: 1) Poll, 2) Questions & Feedback, and 3) Rainbow Magazine Services. While these titles for the three sections are somewhat self-explanatory, we will now cover each in a little more detail.

**Questions & Feedback**

The Questions & Feedback area of the CoCo SIG is an area designed for matters directly related to SIG business and the operation of the CoCo SIG. To enter this area, just enter `QUE` at the `CoCo Sig>` prompt.

Four options are available in the Q & F area. The first is Feedback to SIG Staff. Use this selection if you wish to send a complaint about any aspect of SIG operation. You will be prompted for all necessary information and then given several lines on which to compile your message. We only know how good a job we are doing if you let us know.

The second option in the area is Request for Free Upload Time. Yes, we believe that if you have something you are willing to share with us, you should not be charged for making it available to others. SIG Manager **Jim Reed** (JIMREED) has been quite generous in allocating free connect time to anyone who wants to upload material to our CoCo and OS-9 Online SIGs. So, get your "upload list" ready and send a request with this selection.

Suggestion Box is another important option. If you have an idea you think would be good for the SIG, by all means send it to us via this selection. Your suggestion will be mailed to all concerned SIG staff for evaluation. Keep in mind, while it is true we might have

## DATABASE REPORT

During March OS-9 Online showed an increasing number of uploads, as more and more of our members acquired OS-9 Level II and began to learn about it.

**OS-9 Online Databases:**

In the General Information section, **Ed Orbea** (BASQUE) sent us a list of changes in the `OS9Defs` file. **Ray McCoppin** (RAYMCCOPPIN) gave us a BASIC09 utility to read the Hi-Res mouse or joystick ports. **Dennis Weldy** (OS9ER) gave us a utility to allow RS-DOS source code files to be assembled under OS-9. **Chuck Hoffman** (CHOFFMAN) provided us with an OS-9 Level II boot fix utility that can be used when creating double-sided boot disks.

In the Applications area, **Steve Clark** (STEVECLARK) gave us a program for adding up rows of numbers and another for creating overlays on a screen. **Gene Loefer** (GLOEFER) uploaded a BASIC09 program that creates windows on an 80-column screen.

In the Utilities section, **Toni Ryan** (TNTRHODAN) sent us a new `ccobbler` and `OS9Gen` file, which provided a dump with more features, provisions for creating double-sided boot disks under Level I and for breaking up a boot file into its component modules. Steve Clark provided code to issue 66 carriage returns to simulate a form feed. **George Janssen** (GBJANSSEN) sent us `XREF`, which produces a cross-reference for assembly source files. **Steven Goncalo** (GONCALO) gave us `WILD`, a program to support wild-card functions. Gene Loefer gave us more BASIC09 window setup utilities. **Greg Law** (GREGL) donated a simple utility for unlinking modules from memory in Level II OS-9. **Mark Sunderlin** (MEGABYTE) provided a utility for stripping padding characters from Xmodem files. **Donald R. Grafton** (GRAFTON) gave us a file sorter routine.

In the Device Drivers topic area, Toni Ryan gave us Level II drivers for a RAM disk, an 80-column driver and double-sided device descriptors. Dennis Weldy sent us a tutorial and example of how to write device drivers in the C language. **Kevin Darling** (KDARLING) provided us with an excellent Level II RAM disk driver.

In the Patches topic area, Toni Ryan sent us a patch to the assembler to allow filenames with the underline character in them. Chuck Hoffman provided a patch to shorten the motor off delay and to allow accessing the back sides of D0 and D1 as D2 and D3.

In the Telcom database, **Bill Brady**

---

*Cray Augsburg is RAINBOW's technical editor and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is RAINBOWMAG.*

already heard a similar request, very few requests are "minor" enough not to be made. It is the silent wish that makes a good suggestion.

The last option in the Questions & Feedback area is the Trouble Report. If you encounter any problems with the system in Mail, during a download or anywhere else, please take the time to fill out a trouble report. We have been able to help several members as well as head off further trouble through this avenue of communication. Similarly, timely reports have enabled us to head off minor problems that could have quickly become major problems.

**What Is "Poll"?**

The Poll section of the SIG is just what its name implies. It is an area where *members can create polls* and surveys and vote on other polls. Presently, active polls include such topics as "Interest in Level II OS-9" and "Who Likes the MC-10." At any one time, 20 polls can be active. When it appears a given poll is no longer active, it is archived and placed in the Topics area of the SIG for perusal by all members. Jim Reed is in charge of this area. Since it seems full almost all the time, if you want to create a new poll, you should send him a message via Mail.

When in the poll area, several options are available to you. They are:

```
BROWSE through poll results
CREATE a new poll
EDIT your poll comment
LIST poll names
RESULTS with comments
VOTE on a poll
```

As always, in addition to the above options, you can ask for `HELP` or `EXIT` the area and go back to the CoCo SIG menu. A handy option in the Poll area is `BROWSE`. After entering this command, you will begin to review the present results of all active polls one by one. You will be given an opportunity to `VOTE` or `READ` pertinent comments on each poll before moving to the next. This speeds things up in the poll area and allows you to vote on all the polls that might interest you without having to go through a lot of trouble. The other commands, such as `RESULTS`, require that you enter the name of a specific poll before continuing.

**Visit the Mini-SIG**

For the CoCo user, one of the most important "self-help" areas on Delphi is the Rainbow Magazine Services "mini-SIG." You can get to this area by typing `RAIN` at the `CoCo Sig>` prompt. Another way is to enter the Magazines & Books area off the main Delphi menu and then select Rainbow Magazine Services. However, this would require more work, as most CoCo SIG members have their default menu set up to take them directly to the CoCo SIG upon logon (if you don't, use the Set Preferences item in the CoCo SIG).

Rainbow Magazine Services is an area of Delphi set up for correspondence with RAINBOW magazine. It offers several features that many users will want to take advantage of. Many users already use the area to its fullest extent. The options offered in this area are:

```
Announcements
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Exit
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```

(WBRADY) gave us several new uploads. He generously provided packed procedures for his `BigT Terminal` program that supports Xmodem and a newly proposed variation of Xmodem to facilitate transfer of OS-9 files. He provided `COCOBIN.TXT`, a discussion of his proposal of how to modify Xmodem to deal with problems it causes with OS-9 files. He also gave us full source code for his `BigT` program.

**Color Computer SIG Databases:**

In the CoCo SIG, uploads continued at a good pace. In the General Information topic area, I posted an essay detailing my reservations about the war on drugs. **Mike Fischer** (MIKE88) gave us a humorous item called *Funny Text*.

In the Utilities section, **Jason Ruddock** (JAYR) sent us a code to change the prompt under Disk BASIC on the CoCo 3. **Steve Bjork** (6809ER) sent us a unique disk quality checker. **Jim Sparks** (ESCOMAN) gave us a monitor program called *Color Bug*. **Kurt Stecco** (HIGHRAILER) sent a calendar printer for the DMP-105. **Steve Macri** (DRACMAN) sent us *RS232.PIX*. **Roger A. Krupski** (HARDWAREHACK) sent us a Morse Code utility. **Richard Ferreira** (SKEEVE) sent us a program entitled *1987 Tax Liability*.

In the Music topic area, **Mike Knudsen** (RAGTIMER) gave us two new tunes.

The Graphics section received quite a few new files. The CoCo Galleries for November and December of 1986 and January 1987 have arrived. **Tony Rapson** (TRAPSON) gave us a Serif font set. **Earl Knutson** (BJORNKNUTSON) donated *Mc Paint* printer drivers for the Star Micronix SG10. **Bob Wharton** (BOBWHARTON) gave us National League baseball images and a picture entitled *Top Gun*. **Billy M. Hambric** (SNOOPYDOG) sent us pictures of Alf, Peanuts and other digitized images. **Loren J. Howell** (XENOS) gave us the CoCo 3 program *HCOMP*. **Fred Ahlberg** (FREDAHLBERG) sent us several pictures from Doctor Who. **Richard Trasborg** (TRAS) sent us some converted Atari pictures.

In the Product Reviews section, I uploaded an announcement about a solderless CoCo keyboard extender cable that I will test market at the Chicago RAINBOWfest. **Roy Crosby** (UNCLE) sent us a review of Microwork's latest revision of their superb digitizer, the DS69B for the CoCo 2 and 3. **Andrew Ellinor** (CROPPER) sent us a review of the PBJ 512K upgrade he purchased from Computerware. **Michael Schneider** (MSCHNEIDER) sent us a review of *Koronis Rift*, a new OS-9 Level II game from EPYX sold by Tandy.

In the Source Code for 6809 assemblers topic area, Roger A. Krupski sent us a source code for his Morse Code program. **Alan DeKok** (ALANDEKOK) gave us source code for his *New Attributes* program.

In the Games topic area, Kurt Stecco sent us a submarine war game. **Keith Morabeto** (KMORABETO) uploaded a Yahtzee game. **Craig Green** (SPUDLY) sent us his *Win Ten* lottery number selection game. **Pat Abramovitch** (HUBBS) gave us a *Lunar Lander* game. Loren J. Howell sent us a simple BASIC shoot-'em-up game. **Mike Ward** (MIKEWARD) shared his researches into the game *Rogue*. Game hackers will love this file.

Next month's uploads will likely include some reports of what I and others saw at the Chicago RAINBOWfest. Also, expect to soon see a revision of *RickyTerm* that will, among other things, support the bit banger port on the CoCo 3. There is even a chance that in the next month or two we shall see a version of *WEFAX* enhanced by support for buffers and different frequencies. I also expect we will be seeing more RAINBOW Galleries in the Graphics section. In the OS-9 SIG, members will probably begin to see what will eventually be an additional five megabytes of OS-9 User Group material. Well, I must go now to catch my plane to Chicago. I'll see you all later in the CoCo SIG and OS-9 Online SIG.

**— Marty Goodman**
**Rainbow's Delphi Database Manager**

The Announcements area, while usually used by the SIG staff as a way of posting announcements, can be rather interesting. You might find some items in here that you have not seen before.

Ask The Experts is an area designed to allow you to send questions to RAINBOW's question and answer columnists, Dan Downard, Marty Goodman and Richard Esposito. The questions you pose will be received by these columnists and may be published along with an answer in future issues of the RAINBOW.

Letters to Rainbow is similar to Ask The Experts, except these letters are intended for the "Letters to the Editor" section of RAINBOW magazine. Using Ask the Experts and Letters to Rainbow is very easy and sure beats waiting on U.S. Mail.

As its name implies, Address Change gives you a quick and reliable way of notifying RAINBOW magazine of your new location. Along with Order RAINBOWfest Tickets and Subscriptions On-line, all Address Change entries are received and sent to the subscription department at the Falsoft Building in Prospect, Kentucky. These three options are for the express purpose of expediting transactions with RAINBOW magazine.

The Voting Booth area is identical to the Poll area in the CoCo SIG, except that the polls are different. This means we can offer up to 40 active polls and surveys directly to the CoCo Community at one time.

The Portal to COCO SIG gives you a way to jump into the SIG. Keep in mind, if you came into the Rainbow Magazine Services area from the CoCo SIG, all that is required to return to the CoCo SIG is a press of CONTROL-Z. On the other hand, if you entered the area from the main Delphi menu, you might want to use the Portal option as a shortcut to the CoCo SIG. This is because a CONTROL-Z (if you entered from `MAIN>`) would take you back toward the main menu. This is an important point to remember on Delphi. CONTROL-Z returns you to the menu from which you entered an area.

### Some "Editorial" Comments

Many people have asked the question, "How can I easily edit a message I am sending in Mail or Forum?" Well, in Forum, when you use `ADD` or `REPLY` to create a message, you start out in a "mini-editor." Many folks don't realize this. To see for yourself, during a message, type `/HELP` at the beginning of a line and you'll see:

```
/LIST - lists all lines typed
/DELETE - erases the last line
/EDIT - invokes your editor
/EXIT - same as Control-Z
/QUIT - same as Control-C
```

But, for more sophisticated editing, use the `/ED` (all commands must be at the beginning of a line) to call up either the `EDT` or `OLDIE` editors, whichever you have selected as your default editor by using the Set Preferences selection from the CoCo SIG menu.

You can begin your message in the edit mode in Forum with `ADD/EDIT` and `REPLY/EDIT`.

In Mail, you can use `SEND/EDIT` and `REPLY/EDIT` at the `MAIL>` prompt. This will invoke your editor initially. But, once you have begun a Mail message, you cannot invoke the editor in mid-message.

As a hint, these editor options give you the ability to save parts of your message to Workspace, as well as merge other files from your Workspace into your messages. It can be a very handy feature.

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# RECEIVED & CERTIFIED

*The following products have recently been received by THE RAINBOW, examined by our magazine staff and approved for the* Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

*This month the* Seal of Certification *has been issued to:*

**ADOS-3**, an enhanced, EPROMable Disk BASIC. For the CoCo 3, but will function on the CoCo 1 or 2 acting as a mildly enhanced version of RSDOS. *SpectroSystems, 11111 N. Kenhall Drive, Suite A108, Miami, FL 33176; (305) 274-3899, $34.95 plus $2 S/H.*

* * *

**BSS 512K RamDisk**, a utility program that offers flexibility, requires no BASIC user storage, and is compatible with RS-DOS BASIC 1.0 and 1.1. For the CoCo 3. *Bangert Software Systems, P.O. Box 21056, Indianapolis, IN 46221; (317) 262-8865, $14.95 plus $2 S/H.*

* * *

**BBS Print Spooler, BSS Screen Print, BSS Date and Time, and TYP-O-MATIC Keys**, a series of utility programs that can be run together as an integrated package. For the CoCo 3. *Bangert Software Systems, P.O. Box 21056, Indianapolis, IN 46221; (317) 262-8865, $9.95 each plus $2 S/H.*

* * *

**BTU Analysis**, a program that analyzes heat loss and gain, and calculates proper heating and cooling unit size. For the CoCo 1, 2 and 3. *A to Z Unlimited, 901 Ferndale Boulevard, High Point, NC 27260; (919) 882-6255, $39.95 plus $3 S/H.*

* * *

**Basic Freedom**, a full screen editor that features lowercase interpreter and auto-key repeat. For the CoCo 1, 2 and 3. *Dr. Preble's Programs, 6540 Outer Loop, Louisville, KY 40228; (502) 966-8281; Disk, $29.95; Tape for CoCo 1 or 2, $27.95.*

* * *

**The Best BBS**, a bulletin board system that operates on a 32K CoCo with one drive and a DCM-5, using a standard serial port. *The Saint John Gallery, P.O. Box 613, Mt. Sinai, NY 11766, $12.*

* * *

**CoCo III Unravelled**, a commented disassembly of the new code in the CoCo 3's ROM. *Spectrum Projects, Inc., P.O. Box 264, Howard Beach, NY 11414; (718) 835-1344, $29.95 plus $3 S/H.*

* * *

**Color SCRIPSIT II**, a 16K word processing program that offers a wide range of format options, which enable you to use a variety of type styles; to center, boldface and underline text; and to set tabs and margins. For the CoCo 1, 2 and 3. *Tandy Corp. Available in Radio Shack stores nationwide. $29.95.*

* * *

**CSG IMS**, a database manager that includes all the necessary tools to create business software. It has both relational and network capabilities. For the CoCo 2 and 3. *Kelly Software Distributors, Ltd., P.O. Box 608, Station "T," Calgary, Alberta, Canada T2H 2H2; (403) 236-2161, Single user, $149.95 U.S.; Multiuser, $199.95 U.S.*

* * *

**Custom Palette Designer**, a program that lets you alter any palette slot without having to remember names or numbers of colors. For the CoCo 3 with one disk drive. *Gimmesoft, 4 Hallfield Court, Baltimore, MD 21236; (301) 256-7558, $19.95.*

* * *

**The Disk Scripture Index**, a set of programs designed to make an index of Bible topics and Scripture references. For the CoCo 1, 2 and 3. *Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011; (314) 227-3238, $10.95 plus $2.50 S/H.*

* * *

**Disk Tutorial**, this two-disk package for BASIC/ML programmers gives almost everything you need to know about the disk system. *Microcom Software, P.O. Box 214, Fairport, NY 14450; (716) 223-1477, $36.95 plus $3 S/H.*

* * *

**Dollar Wise**, a personal business utility that takes some of the guesswork out of making major purchases or investments. For the CoCo 1, 2 and 3. *Prickly-Pear Software, 213 Mirada, El Paso, TX 79932; (915) 584-7784, Disk $27.95; Tape $24.95.*

* * *

**Donald Duck's Playground**, a 64K action-packed game to help children ages 7 to 11 develop money-handling skills. Four separate games teach spatial relationships, as well as matching and logic skills, while encouraging creative expressions. For the CoCo 1, 2 and 3. *Sierra On-Line, Coarsegold, CA 93614; $34.95. Available in Radio Shack stores nationwide.*

* * *

**EXAMS III**, a multiple choice, true-false, and/or answer test sheet generator. For the CoCo 3 with one disk drive. *SECA, P.O. Box 3134,* *Gulfport, MS 39505; (601) 832-8236, $24.98 plus $3 S/H, includes 10 free disks.*

* * *

**FONTFILE**, a font library that makes full use of the CoCo 3 graphics capabilities. *Prickly-Pear Software, 213 La Mirada, El Paso, TX 79932; (915) 584-7784, $24.95.*

* * *

**IRA Analysis**, a financial planning program that lets you compare IRAs and get more on your investment. For the CoCo 1, 2 and 3. *A to Z Unlimited, 901 Ferndale Boulevard, High Point, NC 27260; (919) 882-6255, $39.95 plus $3 S/H.*

* * *

**Leonard's Pencil**, a 32K graphics programming utility that creates BASIC programs for generating drawings. For the CoCo 1, 2 and 3 with one joystick. *E.Z. Friendly Software, 1308 Belmont Avenue, Front Royal, VA 22630; (703) 635-1354, Disk, $12.95; Tape, $10.95 plus $1.50 S/H.*

* * *

**Life**, a 32K non-competitive, non-violent Simulation of a colony of cells that live and reproduce according to three rules (survival, death and birth) relating each cell to its neighbor. For the CoCo 1, 2 or 3 with one disk drive. *Prometheus, 14684 Joshua Tree Avenue, Moreno Valley, CA 92388; $20.*

* * *

**Mental Freedom**, a 64K Preble Thoughtware program that combines the technology of the CoCo with Radio Shack's Biofeedback Monitor and features digital speech without a speech synthesizer. For the CoCo 1, 2 and 3. *Dr. Preble's Programs, 6540 Outer Loop, Louisville, KY 40228; (502) 966-8281, Disk, $29.95; Tape, $27.95.*

* * *

**My Artist**, a picture drawing program that uses the high resolution graphics of the Color Computer 3. Pictures may be drawn using four different combinations of color and resolution. *SEESOF, P.O. Box 574, Beaufort, SC 29901; (803) 524-0116, $14.95.*

* * *

**OS-9 Text Formatter**, a word processor that runs under OS-9 Level I or II. For the CoCo 1, 2 and 3. *Computerware, Box 668, 4403 Manchester Avenue, Suite 102, Encinitas, CA 92024; (619) 436-3512, $34.95.*

* * *

**QIKPOINT-SC**, a set of floating decimal point arithmetic and matrix routines designed for use with the CoCo expanded by the SC68000 expansion board made by Cir-Pac, Ltd., using *Kamelion* as the interface operating system. *D.J. Leftler, 955 Trinidad Road, Cocoa Beach, FL 32931; (305) 783-2713, $47.75; $99.50 supplied with* Kamelion. *Users manual, $9.*

* * *

**Screen Star**, a program editor that runs under Level I or II of OS-9. Use with OS-9 Text Formatter or Radio Shack's *TS Word* for word processing. For the CoCo 1, 2 and 3. *Computerware, Box 668, 4403 Manchester Avenue, Suite 102, Encinitas, CA 92024; (619) 436-3512, $49.95.*

* * *

**Super Extended BASIC Unravelled**, a book of information on the high resolutions graphics commands and BASIC enhancements available from the Color Computer 3. *Microcom Software, P.O. Box 214, Fairport, NY 14450; (716) 223-1477, $24.95.*

* * *

**Superthello**, a 32K computer version of the popular board game. Develop game strategy for a 100-square grid and test your skills while racing against the clock. For the CoCo 1, 2 and 3 with two joysticks. *SECA, P.O. Box 3134, Gulfport, MS 39505; (601) 832-8236, $21.98 plus $3 S/H.*

* * *

**Supplement to 500 Pokes, Peeks 'n Execs**, a book that contains 200 additional POKEs, PEEKs and EXECs to the popular book. *Microcom Software, P.O. Box 214, Fairport, NY 14450; (716) 223-1477, $9.95 plus $3 S/H.*

* * *

**VCR File**, a 32K file program for video cassette tapes. Individual entries may be sorted, edited, printed, labeled, deleted or added to. For the CoCo 1, 2 and 3 with one disk drive. *Sunrise Software, 8901 NW 26th Street, Sunrise, FL 33322; (800) 628-2828, $19.95 plus $2 S/H.*

* * *

**Winnie the Pooh in the Hundred Acre Wood**, a 64K Adventure game for ages 7 and up. The blustery wind has mixed up everything in the forest and Christopher Robin and his friends are waiting for someone to return their missing belongings. Be a hero and they're sure to throw a big party for you! *Sierra On-Line, Coarsegold, CA 93614; $34.95. Available in Radio Shack stores nationwide.*

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

**— Judi Hutchinson**

# *The Word Factory — Synonyms and Antonyms*

*The Word Factory — Synonyms and Antonyms* is a game of word meaning for children and adults. The game is written for a Color Computer with 64K Extended BASIC and at least one disk drive. A printer is required only if you intend to print word tests. The game is written in BASIC and uses ASCII data files to supply the lists of words. The actual program uses a binary version of the ASCII file you create and places it in an unused 8K portion of RAM to enhance its speed.

The program disk is unprotected, and the manual requests you make a backup copy before using for the first time. The manual also requests you honor the program copyright.

The main menu consists of three options: A) Play The Game; B) Use List Maker; and C) Use Printer. Selecting A begins the game by asking which of the six word lists you want, how many players, difficulty level, and antonyms or synonyms. The @ key allows you to return to the previous option and correct your choice.

The main game screen is a high resolution graphics screen containing four circles in the top section and a polygon in the bottom-center. Next to the polygon, on both sides, there are two triangles. The left side is for Player 1 and the right side is for Player 2. The upper triangle contains the number of right answers, while the bottom one contains the number of wrong answers. Choosing the one-player option allows you to save the score to disk so a student can compete with the entire class. The two-player option is for one-on-one situations only and does not allow you to save the scores.

To play the game, a word appears in the polygon and four more words in the circles. The player must choose the correct synonym or antonym depending on which option was previously chosen. A hand points to one of the four circles and may be moved with the arrow keys. You must select the correct answer with the hand and, according to the manual, press the ENTER key. However, I found the ENTER key did not work, and I had to use the space bar instead. At the end of each game, a score card containing the number of right and wrong answers and the percent correct is presented to each player. The scores may be saved as stated above, and the top 10 will be displayed.

> ***"Choosing the one-player option allows you to save the score to disk so a student can compete with the entire class."***

Option B selects the word list menu. You are allowed to create new lists, add to existing lists, or correct a list. Each list may be protected by a password to keep the younger players from destroying the list. The lists are originally created as an ASCII file containing three words per record. The first word is the master entry, while the second and third are the synonym and antonym respectively. There are six word lists provided with the game. When you finish creating a list, you are asked if you want to format it for program use. This formatting converts the list into a binary form, as stated earlier, and enhances the speed of the program. You may create separate data disks containing only word lists; however, the binary version must be on the program disk itself when you want to use that particular list.

Adding to a list is essentially the same as creating a new one. You are allowed to select the list you want to add to and, from that point on, it functions identically to the create list option. The correct list option works only on the binary form of the list. It is used to correct misspelled words by choosing a list and entering the word as it was incorrectly spelled. Once the word is located, you may correct the spelling and re-save the list. You must keep in mind, this does not correct the ASCII source list. If you later add to this list and format a new binary copy, the corrections will be lost.

Option C lets you select a word list and print a test to paper. You may use up to 200 words per test. There will be 25 words printed per page. The lists are password-protected for this option also.

*The Word Factory — Synonyms and Antonyms* is a very nice package for young and old alike. I must admit there are words in the sample lists provided that I do not recognize, and I could learn from this program.

**(SECA, P.O. Box 3134, Gulfport, MS 59505; 601-832-8236, $19.98 plus $3 S/H)**

**— Larry Birkenfeld**

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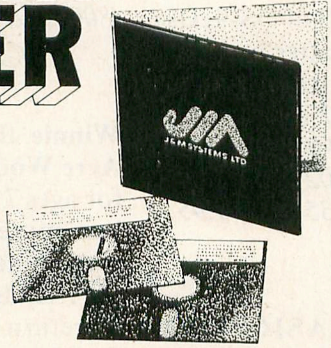

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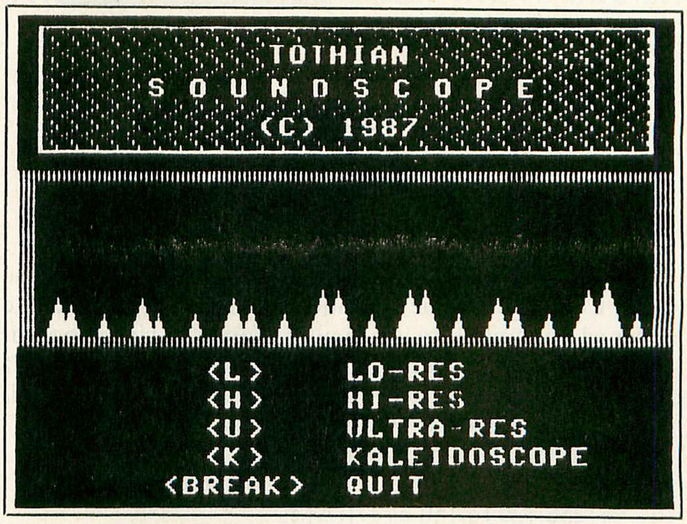
# Picture It With *Soundscope*

I've been teaching science for nearly 16 years, and one of the topics of study has always been sound. When THE RAINBOW sent me *Soundscope* for review, I was more interested than usual, because it looked like a program I could use in my physics classes to show what sound "looks like." The program is easy to use and loads from either tape or disk. The single-page instructions include all the information necessary to run the program and its four options without problems. They also include a short explanation of sound waves that, although simplistic, is clear and correct. Included with the instructions are three screen dumps of the program display. Operation is simple. You load and run the BASIC program, Scope. Scope loads a machine language program and a high resolution graphics screen that forms the background for the program display. After all parts of the program are loaded, you are instructed to put an audio tape in the cassette recorder and press Play. Immediately, the screen begins to show a Lo-Res display of the sound from the recorder. While the program is running, you have the option to switch to any of the other three displays or to quit the program. If you quit you can resume display easily. In addition to Lo-Res, *Soundscope* has three other display modes: Hi-Res, Ultra-Res and Kaleidoscope.

The Kaleidoscope option displays a rapidly changing color display of the sound. This display is very interesting. It would make a great background display for a music demonstration or something of that sort. Hi-Res and Ultra-Res modes, as their names imply, are higher resolution versions of the Lo-Res display mode. The advantage of higher resolution displays is greater detail. The disadvantage is less speed. There is a noticeable delay in the Ultra-Res mode; it isn't displaying in real time. This isn't a problem, just a different method of display that trades detail for speed. All of the displays are entertaining. *Soundscope* is worth the price for the entertainment value alone. In fact, for entertainment, I recommend *Soundscope* heartily.



```
TOTHIAN
S O U N D S C O P E
(C) 1987

    <L>      LO-RES
    <H>      HI-RES
    <U>      ULTRA-RES
    <K>      KALEIDOSCOPE
 <BREAK>     QUIT
```

It wouldn't be fair to end the review here, however. After a couple of weeks of watching and experimenting with *Soundscope*, I'm still not sure exactly what is being displayed. I fed it a musical scale played very slowly on a piano, and I couldn't see anything that resembled the standard oscilloscope display I expected. The distance between peaks normally representing frequency or wavelength didn't vary correctly with changing pitch over the entire octave range. *Soundscope* is fun, interesting and entertaining, but it isn't an oscilloscope and doesn't display sound in a conventional way. Buy *Soundscope* for enjoyment, but do not expect a program that can be used to analyze sound waves in a measurable way.

**(Tothian Software, Inc., Box 663, Rimersburg, PA 16248; $19.95)**

**— Donald McGarry**

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# JramR: 512K Upgrade for the CoCo 3

J & R Electronics has released a 512K upgrade for the Color Computer 3. The upgrade, called JramR, is available either as a complete, ready to plug in and run circuit board, or just the bare circuit board with special header pins. If you choose to build your own and order the kit, you will have to purchase these components also:

| | |
|---|---|
| 16 | 16-pin IC sockets |
| 16 | 41256 120 to 150 ns DRAMs |
| 16 | 0.1 Mf or 0.01 Mf ceramic capacitors |
| 1 | 10 to 47 Mf electrolytic capacitor |

The kit comes with an illustrated, easy to follow, step-by-step assembly and installation booklet. The double-sided glass epoxy circuit board is well-made and measures 4¾ inches by 2$\frac{15}{16}$ inches. The circuit etchings are very close together and, unless you are experienced in soldering small electronic connections, I recommend you buy the completed board. Although I did not assemble the kit for this review, I consider myself to be an experienced technician and estimate it could be assembled in about an hour. In the case of either the kit or the fully assembled product, the installation procedure is the same. Several suggestions are given to ensure stray static electricity is not present before handling the board. The four 128K RAM chips (IC16, IC17, IC18 and IC19) are removed. I stored mine in conductive foam and wrapped them in aluminum foil for safekeeping. Capacitator C65 must also be removed and can be clipped with wire cutters. The JramR upgrade mounts the components on top of the board. This is a good idea since it allows better air circulation around the chips. J & R was wise to use special header pins that contain an integral spacer. This prevents the board from being pushed down too far into the sockets on the CoCo 3 board. The spacers serve to prevent electrical contact between the bottom of the JramR board and components on the CoCo 3 board. Although no ground plane shield is used, I did not detect any RFI (Radio Frequency Interference) on nearby radio equipment or a TV set.

One of the best things about this upgrade is that it comes with some very useful utility software. With either the kit or assembled board, you get a disk and an 18-page user's manual full of helpful ideas on using your expanded memory. The disk contains the following programs:

| | |
|---|---|
| *JRAMRDSK* — | a customizable RAMDisk program that patches into DOS and emulates one or two FAST disk drives. |
| *JRAMRSPL* — | a customizable machine language printer spooler program that allows you to compute while your printer prints. |
| *JRAMRTST* — | a RAM test program that lets you see if all 512K is functioning. |
| *RAMDSKUT* — | a BASIC subroutine that allows the user to do things such as change a RAMDisk drive assignment or back up from the RAMDisk to your real drive. |

I tried all of the programs and they worked fine. Most impressive was *RAMDISK*. The ability to do a directory without a drive coming on and nearly instant loading of programs is quite impressive.

I think J & R Electronics is on the right track with their upgrade. The do-it-yourselfer or the non-hacker can both be satisfied, and the inclusion of some pretty nice software rounds out the package.

**(J & R Electronics, P.O. Box 2572, Columbia, MD 21045; 301-788-0861, $139.95 Assembled; $109.95 Kit plus $4 S/H)**

**— Jerry Semones**

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# Magical Spells and Treasures Abound in *Cave Walker*

"Grab your hat and enter the legendary Cave of the Mystics. Within this underground palace, magical spells and treasures abound. Do you have what it takes to find the secret vault and the fabulous Treasure of the Ancients? Watch out for the steam jets and the Great White Bat, whose sole purpose is to stop you."

And so we begin a review of one of Tandy's latest entries into the game arena, *Cave Walker*. This game requires a 64K CoCo with disk drive and joystick. It operates under the OS-9 Level I shell that comes on the disk, but has some provisions for Level II OS-9.

*Cave Walker* brings together the concepts of the Adventure game and the arcade game. Your objective is to find the treasure chest that controls the entrance to the secret vault. But first, you must find the three spell books that give you the magic key needed to open the treasure chest. The method of moving through the caverns is determined by careful manipulation of the joystick, as in a classic arcade game. While this blending of the two game forms is not particularly new, *Cave Walker* is set up in a way that makes it interesting and definitely challenging.

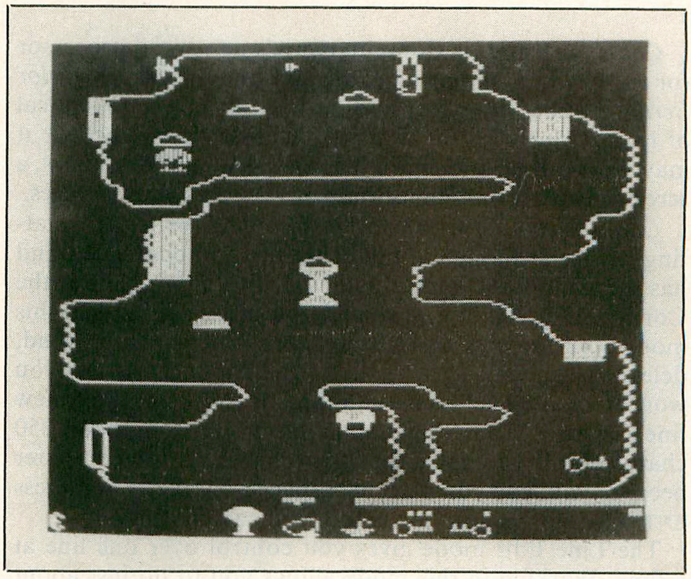
To effectively play the game, you will have to master jumping and good joystick positioning. This can be achieved by using the practice game mode and the jump meter at the top-center of the screen. This meter reflects the position of the joystick. When the joystick is positioned at the edges, long distance jumps are achieved. With the joystick positioned near the center, you can jump virtually straight up. However, you have to be steady with the joystick in order to keep from falling off cavern ledges. As you can see, learning how to jump with the joystick is crucial to this game.

To aid you in moving from cavern to cavern, you must collect door keys that allow you to open a door to the next cavern. If you have collected some of the bags of gold that are found in the caverns, you not only score points but a bag can be used to open a door. Also, scattered throughout the caverns are locks that open new passages and make hidden doors or passages appear. Of course, you need to find a lock key to open them.

When you move around a cavern, you need to use certain objects. Floating islands move you either vertically or horizontally. Some of these islands require considerable skill to get on them; hence, the need to develop good jumping skills. Pillars rise and fall out of the cave floor and can be used to move to different levels of the cavern. Some caverns also have springs to increase jumping distance.

In all of the caverns, there are objects that you should avoid. One of these is the firepit. Care must be taken when jumping over the firepit, as fireballs are often emitted. On the ceilings of most caverns are steam jets, which shoot down like lasers. On the sides of caverns, there are cannons that fire missiles. Contact with any of the these results in death. Even if you are successful in avoiding these dangers, you still must watch out for the great white bat. If you are bitten by the white bat, you lose strength equal to half of the maximum.

Throughout the caverns there are objects, such as flasks, umbrellas and rings, which protect you from the dangers of the caverns. Be careful of your jumping, for even non-fatal falls reduce your strength. So, watch the strength meter at the top-left corner of the screen and pick up loaves of bread to increase your strength whenever possible.



Keep in mind it is always possible to save a game, so you don't have to start with the first cavern when you lose a game. However, *don't save a game too many times!* No, your computer won't blow up, but your final score is affected by the number of game saves during a game. When you complete the game, you receive a bonus of 30,000 points if you have not saved and/or loaded the game more than 10 times. If you do more than 10 saves or loads, you lose 500 points for each save or load.

*Cave Walker* was designed to run on all models of the Color Computer with at least 64K of memory. With a CoCo 1 or 2, the game operates in the standard `PMODE 4` graphics with artifacted colors. With a CoCo 3 and an RGB monitor, there is a provision to produce color.

At the beginning of this review, I noted that *Cave Walker* also runs on a Level II OS-9 system. Unfortunately, Level II was not available at the time of this writing, so we were unable to test this option. However, according to the manual, the Hi-Res graphics of the CoCo 3 are used. Also, there is a provision for two-button control from the joystick when using Level II. On Level I systems, the space bar is used instead of the second button.

Overall, I enjoyed the game very much. Although the theme of *Cave Walker* is similar to a number of games, I found it to be a real challenge. So much so, that I haven't gotten through a game during the month I've been working on this review.

It is important to emphasize the care that went into this game. It appears every effort was made to make the game compatible with all CoCo models and still take advantage of some of the CoCo 3's features. Of course, this will not always be possible, but it's nice to see that the effort was made.

**(Tandy Corporation. Available in Radio Shack stores nationwide, $29.95)**

**— Donald Dollberg**

# *Color Scribe III*
# Word Power for the CoCo 3

*Color Scribe III* is Computerware's new word processor for the CoCo 3, requiring 128K and one disk drive. *Color Scribe III* is a line editor and, at first, I was very skeptical of its usefulness. After using it for some time, I believe it may be the best line editor I have seen. While it is not a screen editor, it has a multitude of very powerful features.

*Color Scribe III* uses "dot" commands for text formatting. It has a maximum line length of 250 characters and has three modes to manipulate your file. First, there is the Command mode. You work with the entire file here. In this mode, you are able to move selected blocks of text, find, delete or change specific words. The Input mode lets you work with one line of text at a time. It is used to input new lines. Again, each line has a maximum length of 250 characters. If you enter the 251st character, the computer beeps at you, and you must backspace a character and press ENTER to start a new line before you can continue.

The Line Edit mode gives you control over one line at a time. Working in this mode allows you to do just about everything to a line of text: insert or delete characters, break a line into two lines or combine two lines together. When combining two lines, you must be careful not to combine lines that would make a line longer than 250 characters. It will then display 251 characters, signal with a beep, and the remainder of the line will be lost. You will then have to backspace one character (to 250) and press ENTER.

Turning to the display, the Default Screen mode displays 40 by 24. The options for the display include 40 by 24 (default), 64 by 24 or 80 by 24. You can select a blue, green, amber or monochrome (black and white) screen. You also have the option for inverse video. Now, once you settle on your favorite setup for the screen, save it and load that program with the default mode you want.

One more turn reveals commands that allow you to manipulate parts of your file in the three modes. The available commands include a type of Search and Replace with a confirm option. To view your file, you can either Print the file to a printer or List the file to the screen. If you want the screen listing to appear as what will be printed, use the Format function. This implements all the special features, but more on Format later.

*Color Scribe III* has many features not always found in other line editors. A Bell command lets you set a bell to sound when entering a character in a specific column. This corresponds to the margin bell on a typewriter. If you are a quick typist, sometimes the character being typed as the bell goes off is not always received by the computer. When you want to save your work, *Color Scribe III* has the capability to write the whole file, or only a specific block, to disk. This can come in handy if you want to save a portion of your file so it can be used in another file. The Free command provides you with the amount of free buffer space. The buffer starts out with just under 64K bytes free. If you find that this is not enough to cover your entire file, a More command allows you to have and edit a file larger than 64K bytes. The Clone command saves your customized version of *Color Scribe III* to disk under the name `CLONE.BIN`.

Once you are ready to see how your file is going to look on paper, the Format command comes in. This starts the text formatter and implements all the "dot" commands embedded in the file. You have the option of `.FI` (default: Fill) or `.NF` (No-Fill) for line formatting. The Fill command does a right-hand justify and implements word-wrap. Then if you turn Fill off by `.NF`, this is close to a ragged-right mode. I say close because if you have a line longer than the specified line length, the line will be cut off at the line length exactly, even if it puts part of a word on one line and the rest on the next line. This would be a good place to use the Bell command.

I stated earlier that each line can be as long as 250 characters. Well, each line is appended successively when the Format command is given so, when you want to start a new paragraph, you enter a `BREAK` (`.BR`) or `SPACE` (`.SP`) to separate paragraphs. This sounds a little confusing, but in practice it is fairly simple. The point is that you will not want to have all your lines at 250 characters. I suggest close to the line length you want printed out. *Color Scribe III* supports many special features, such as centering, underlining, headings, footnotes, and relative indenting, and has the capabilities of sending user-defined control codes to the printer for other special effects.

**(Computerware, 4403 Manchester Ave., Suite 102, Encinitas, CA 92024; 619-436-3512, $49.95 plus $2 S/H)**

**— Dale E. Shell**

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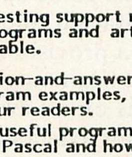
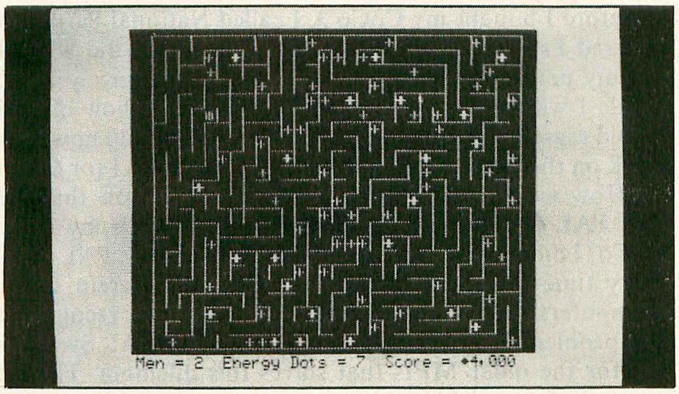


# Pick Up the Path with *The Amazin' Maze Game*

Many of you probably have sat down with the daily newspaper or a favorite puzzle book and traced your pencil up, down and sidewise in the complex labyrinth of a maze. Some professionals never get over the fun of the maze and love to watch mice or rats find their way through mazes for a reward of cheese. Well, *The Amazin' Maze Game* provides that same fun. Instead of cheese, the reward is the high score. Mikaron Software has developed a maze game that includes 60 mazes to keep the maze fanatic happy for quite a while. The game requires a 64K CoCo with one disk drive.



```
Men = 2  Energy Dots = 7  Score = •4,000
```

*The Amazin' Maze Game* should not be written off as another variant of Pac Man. There are no "beasties" chasing you around the maze; you can take all the time you need. You start at one end and try to find the best way through the maze to the other side. Very simple, or is it? The mazes provided with the game are fairly complex and should give everyone a good challenge. Starting with three men, you proceed through the maze trying to find the best way out, while accumulating points. Points are accumulated by collecting the white objects scattered throughout the maze. These are worth 1000 points each. The blue objects are the destroyers; don't pick them up unless you have picked up three red objects, the energizers, for every one destroyer that you cross. If you haven't picked up at least three energizers, then you lose your man. If you have three energizers, then you get 500 points when you pick up the destroyer. You now have to find three more energizers in order to cross over the next destroyer. That's the challenge — to find the path through the maze, all the while accumulating energizers to get through the passages that the destroyers have blocked. While doing this you must accumulate as many white objects as possible.

*The Amazin' Maze Game* is written in machine language with the maze displayed in the artifacted `PMODE` 4 colors. While the game runs on a CoCo 3 with a TV, it cannot be run on a CM-8 RGB monitor, as it appears in black and white. Movement through the maze is controlled by the arrow keys. A joystick would have been nicer, but it is not a major loss. Overall, *The Amazin' Maze Game* is a neat game and certainly well worth the modest price.

**(Mikaron Software Company, P.O. Box 1064, Chester, CA 96020; $9.95 plus $.50 S/H)**

**— Donald Dollberg**

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# PAL Switcher Solves Multi-Pak Dilemma

One of the first things we learned when the new CoCo 3 came out was that the Multi-Pak Interface (MPI) would not work unless its internal PAL chip was replaced. We also learned that this was a lot easier to do on the old Multi-Pak (R.S. Catalog No. 26-3024) than it was on the newer version (R.S. Catalog No. 26-3124). If you have the newer 26-3124, this review will not be of interest to you, so I recommend you read Marty Goodman's upgrade article in the January 1987 RAINBOW on this subject.

Before I bought my CoCo 3, I called National Parts and ordered Part No. AXX-7123. The first thing I did when I got my new CoCo was to change PAL chips in my MPI. While I was making this change, I wondered how often I would regret changing the PAL as the MPI would now only work on the CoCo 3 but not on my older CoCo 1 (or CoCo 2). How would I be able to use *CoCo Max* now that the new PAL chip was no longer compatible with my older CoCo? I did not like the idea of having to change PAL chips every time I wanted to use the MPI on different Color Computers! Well, obviously Marty Goodman recognized this problem early because he has designed a PAL Switcher Kit for the older MPIs that solves this dilemma. The kit consists of a small 2½-inch square, single-sided, glass epoxy printed circuit board that contains sockets for both PAL chips. A third "header" socket plugs into the original PAL socket in the MPI, and an attached double pole, single throw switch is mounted on the MPI so either PAL chip can be selected. Since you have to remove the old PAL chip anyway to insert the new chip, it makes sense to install this board while you are at it so you can maintain full compatibility on all CoCos.

The kit is very easy to install but does require you to open the MPI case (keep this in mind if yours is still under warranty). The documentation consists of 1½ pages of typewritten, easy-to-follow steps and illustrations to complete the installation. You will also have to drill a ¼-inch hole in the case of the MPI to mount the switch. I put mine just to the left of the slot selector switch and it works just fine there, but you can put it anywhere you like since about 7½ inches of wire is attached to the switch. No soldering is required and total installation time is about 20 minutes.

The PAL Switcher is offered in two versions. You can buy just the kit for $29.95 or the kit with the new PAL chip installed for $39.95.

This is a product that will be very well received in the CoCo market. It provides the opportunity to not only upgrade your MPI for use on the CoCo 3 but to continue to use it on your older CoCo as well. It's a good idea at a fair price.

**(Spectrum Projects Inc., P.O. Box 264, Howard Beach, NY 11414; 718-835-1344, $29.95 w/o PAL; $39.95 w/PAL plus $3 S/H)**

**— Jerry Semones**

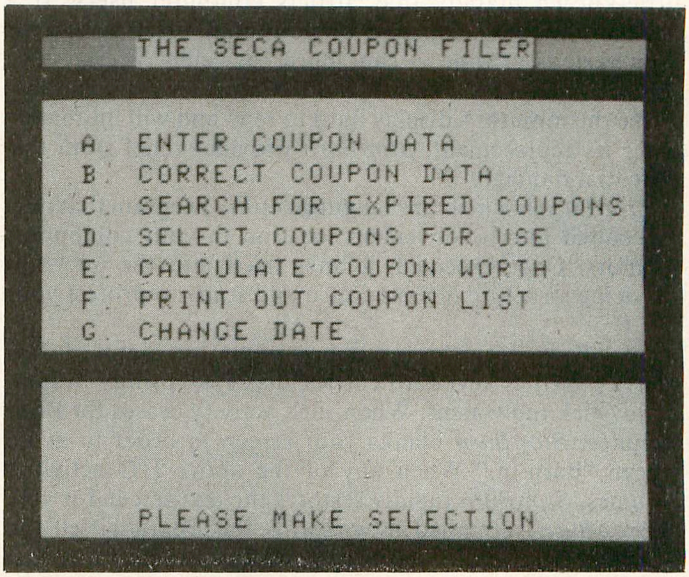
# SECA Coupon Filer Takes Charge

Ah, database programs—such handy things. Southeastern Computer Arts markets a coupon filer program that is, in essence, a dedicated database program. Nearly any database program could be set up to do this job, since by their nature database programs are flexible creatures. A good database program can be used for a wide variety of tasks, but may not be ideally suited for each — there may need to be some compromises made. On the other hand, you gain the convenience of a single set of commands to learn and the ability to tailor data input and output to your needs. A dedicated program such as the *SECA Coupon Filer* is not flexible. It is meant to do one job only, but to do it well, and with all functions optimized for the task at hand. *Coupon Filer* is successful in all those respects.

> ***"It is meant to do one job only, but to do it well, and with all functions optimized for the task at hand."***

*Coupon Filer* has seven main options: enter data, correct data, search for expired coupons, select coupons, calculate coupon worth, print a list of coupons, and change entry date. The first two and the last are self-explanatory. The third allows the user to find and delete any outdated coupons from the file. The fourth option allows the user to scan through the coupons on file and select one to use on a shopping trip. The program then allows you to print a list of the selected coupons and delete these coupons from the file. The fifth option figures the worth of the coupons on file and shows it on the screen, and the sixth option prints a complete list of all the coupons on file including the total worth. A maximum of 200 coupons can be stored.

All the program options work as stated in the manual. The overall program worked smoothly. The user is protected from input errors in nearly all instances. The information screens and menus are attractive, and the manual is complete, neatly printed and well-organized. The program is provided on an unprotected disk and carries a 90-day warranty. A printer is recommended but not required.



```
THE SECA COUPON FILER

A. ENTER COUPON DATA
B. CORRECT COUPON DATA
C. SEARCH FOR EXPIRED COUPONS
D. SELECT COUPONS FOR USE
E. CALCULATE COUPON WORTH
F. PRINT OUT COUPON LIST
G. CHANGE DATE

PLEASE MAKE SELECTION
```

As with any database program, initial data entry is time-consuming. The payoff should come with the resultant rapid manipulation of data, and the ability to select and print that data in a variety of forms. The purpose of a database program should be to make the user's life easier. But *Coupon Filer* seems to add more work, not relieve it. Coupons still have to be cut, put in some sort of file, and manually retrieved for use when this program is used; but in addition, they must now be entered and selected electronically as well.

In short, *SECA Coupon Filer* works well, is user-friendly, and is well-documented, but may not actually save the user any time.

**(Southeastern Computer Arts, P.O.Box 3134, Gulfport, MS 39505; 601-832-8236, $19.98 plus $3 S/H)**

**— Mark Williams**

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**Code Buster machine language disassembler** Three terrific programs to explore machine language. Screen or printer accurate disassembly of binary code. Simple prompted procedure with some instruction to dissect and understand your ROMs. Fully documented for only $19.95 ($24.95 CDN.)

# *StopBurn*: The CRT Saver

*StopBurn* is a utility that provides needed relief from a little-known malady that afflicts computer users. If a constant image is displayed on your computer's screen for long periods of time, it can "burn" or "etch" its way into the coating on the inside of your monitor. This will, in time, make the monitor's display hard to read and will ultimately force its replacement. *StopBurn* provides relief from this potential damage.

*StopBurn* is a machine language utility program that may be loaded into a convenient location in your computer's memory. Once executed, it links itself into the interrupt servicing structure in your CoCo and starts to protect your CRT.

*StopBurn* monitors your computer for signs of I/O activity such as keyboard entries, disk I/O, printer output, or joystick movement. When such activity ceases for three minutes, *StopBurn* blanks your screen in order to avoid screen "burn-in." When any of the above I/O activities resumes, *StopBurn* rapidly restores the text screen for you.

*StopBurn* is supplied in two forms: the program itself and a testing program called StopTest. The difference is that StopTest is intended to be used for testing purposes only, and blanks the screen after 10 seconds, not the three minutes required for *StopBurn*. Other than that, the two programs are identical.

The documentation supplied with *StopBurn* is in the form of a BASIC program, The Book, which can be run from Disk BASIC. The program provides the minimum knowledge necessary to use *StopBurn*. Personally, I would prefer to see printed documentation, for it eliminates the need to run a BASIC program to review the operation of the program.

The instructions concerning how to load *StopBurn* from within a BASIC program were incorrect. Space should be cleared *before* `LOAD`ming the program, not after, as the direction program, The Book, stated. I view this as a simple oversight and, hopefully, it will be corrected shortly.

I had some difficulties using *StopBurn* in the high-RAM locations. Most of the problems were related to nonperformance of the program. This was especially true when using my CoCo 3. The program would simply not run properly. If loaded at other locations (such as &HE00), the program worked fine. However, when using StopTest, the screen would blank every 10 seconds, then return to normal color almost immediately. I was expecting the screen to stay darkened, waiting for a key press, and I was unable to determine why this instance occurred. This problem did not exhibit itself when using *StopBurn*.

I have used similar programs on my IBM computer. I feel that *StopBurn* offers some refinements over these programs. Despite its few idiosyncracies, *StopBurn* is a valuable utility for the medium-experienced CoCo user.

**(Lucas Industries 2000, 14720 Cedar Street NE, Alliance, OH 44601; 216-823-4221, $15)**

**— Don Hutchison**

# *Lockout* Secures Your Disk Contents

When I received *Lockout* to review, I immediately started thinking of how this program could benefit someone. As a teacher, I could lock my grade and test files. As a programmer, I could prevent unauthorized snooping at any programs I was developing. A small business could use it to protect financial or inventory reports. A parent could lock up the games until homework is done. Just about everyone has something he would like to secure. With those thoughts in mind, I read the documentation and was ready to go.

There are two pages of documentation that fully outline the procedures for locking your disk. The software is user-friendly with one menu that does all the work. As with all software, step one should be to back up the master disk. The standard backup command works. The directory contains two programs: `LOCK.BAS` for the CoCo 1 and 2 and `LOCK3.BAS` for the CoCo 3. Both programs may be customized as to default drive number, and `LOCK3` may be changed to re-enable the BREAK key and to alter the palette to your liking.

You are directed to load the program for your model computer and follow the directions for customizing and inserting your password. The password may be up to 255 characters in length. When you run the customized program, you are instructed to save it under `LOCKOUT.BAS` or `LOCKOUT3.BAS`. This program can then be placed on any disk you want to protect, or left on a system disk. It need not be on the disk you are locking.

*Lockout* has four menu options: 1) Lock a Disk, 2) Unlock a Disk, 3) Select Drive and 4) End. If you choose Option 1, you are given the option of using a double password system. The second password may be up to eight characters. When completed, your disk is locked. If you exit the program and type `DIR` you see only one program, `UNLOCK.BAS`, or the word `LOCKED` if the program isn't resident on that disk. Your disk will seem full. If you run `UNLOCK`, you get the same menu as before. Option 2 allows you to enter the password(s) and, presto, your disk is unlocked. `DIR` will show the original directory.

I was curious as to how secure the disk was. I am an experienced BASIC programmer, but looking at *Lockout* didn't give me any clue as to how it worked, or what the password(s) were. In that sense the disk is secure. I pulled out a disk zapper, dusted it off, and in five minutes I had an unlocked disk. So, the security of the disk depends on the skill of the person trying to crack it. It does lock out the casual intruder, but it might be nice if, when the original directory is relocated, it is encrypted in some fashion.

If you need a program that will lock the disk in the manner described above, then *Lockout* is one to consider. It is easy to use and not very expensive.

**(Custom Software, Box 42, Long Lane, MO 65590; 417-345-8163, $15 plus $1.25 S/H)**

**— Aram Langhans**

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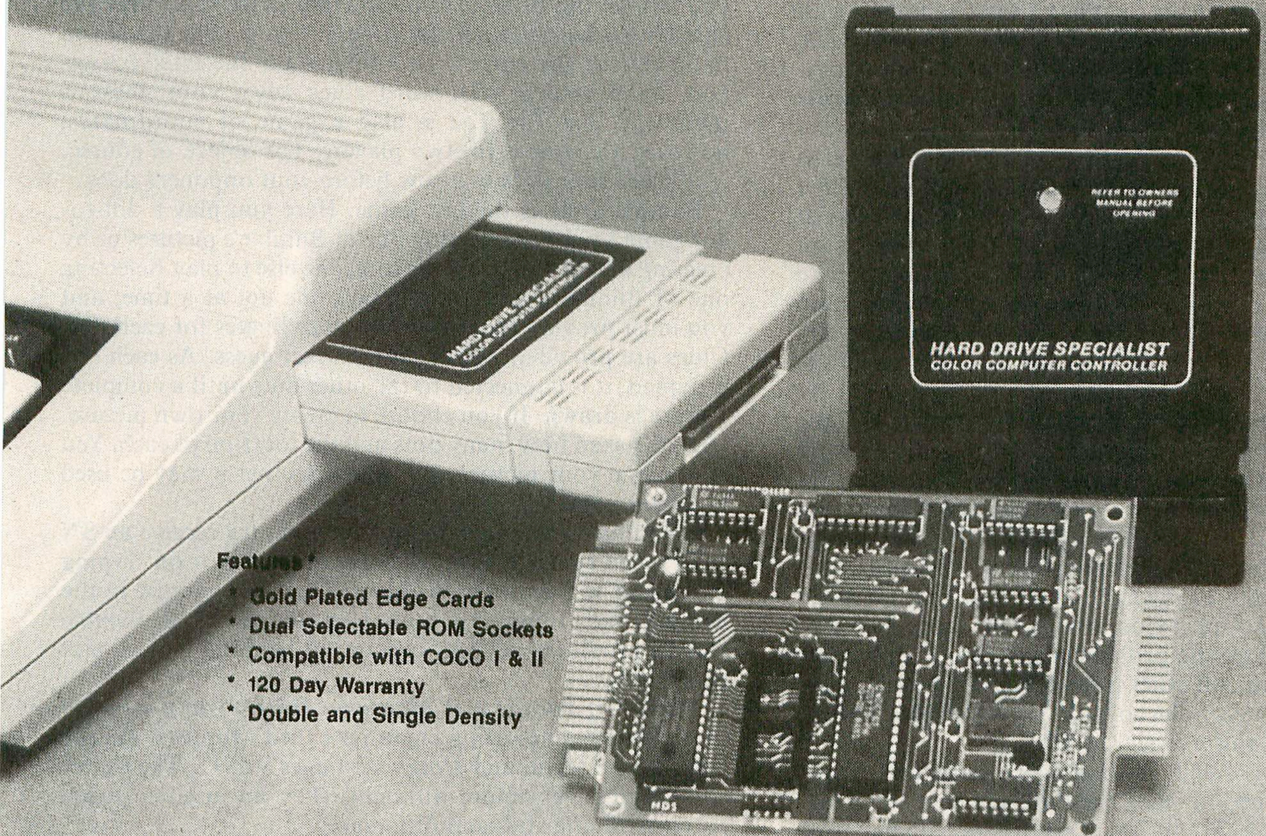
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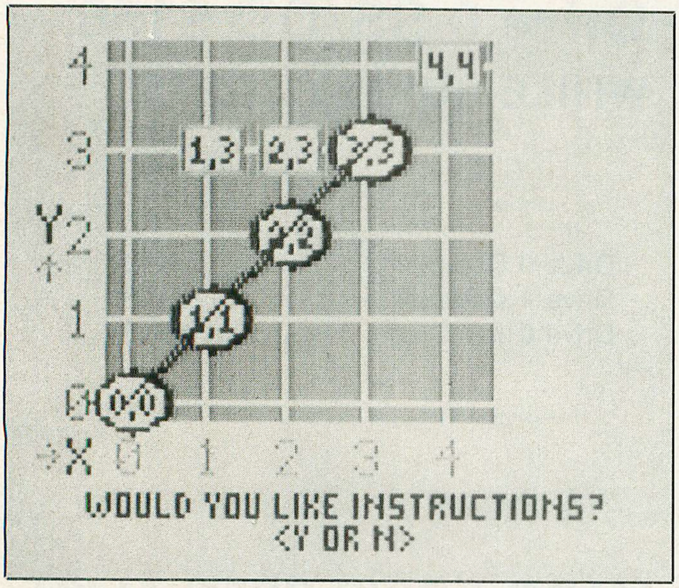
# More Challenges From The Learning Company

Education blooms again on the Color Computer with software from The Learning Company. *Moptown Parade, Moptown Hotel* and *Magic Spells* all require a Tandy Color Computer, Extended BASIC and a disk drive. *Bumble Games* may be purchased on cassette.

*Magic Spells* is a game designed for children ages 6 to 10. It provides spelling exercises in the form of scrambled words or a flashcard technique where words are displayed briefly on the screen and the student spells them from memory. Sample word lists are provided, or you may make up your own and save them to disk. The lists may contain up to 20 words, and each word may be up to 15 characters in length. Utilities are provided to copy lists, add new lists, and delete lists, as well as display a list.

Each time a correct answer is given on the first try, the student receives a reward represented by a picture of a full treasure chest. If it takes more than one try, you must split the treasure with a demon. If you receive assistance from the computer, the demon receives all of the treasure. *Magic Spells* is very interesting and can provide a great classroom experience. The only problem I found was that my copy came with a manual for a Commodore 64. Since I used to own one of these, I had no problem translating the program loading instructions. All other instructions are built into the game, so you will have no problem once you load it. Maybe Tandy can correct this oversight soon.

*Bumble Games* is an educational math program for ages 5 to 10. It is designed to teach the basic concepts of arrays and grids. The program consists of six different games using a grid and x,y coordinate techniques. It comes on either cassette or disk.



WOULD YOU LIKE INSTRUCTIONS?
<Y OR N>

The first game, Find Your Number, provides a straight line numbered from 0 to 5 either horizontally or vertically. The object is to guess the number the computer has chosen. After each guess, an arrow is provided to indicate if the correct number is higher or lower than the number you chose. Games two and three, Find the Bumble and Butterfly Hunt, provide a 4-by-4 or 5-by-5 matrix of boxes lettered 'A' to 'D' or 'E' horizontally and 0 to 3 or 4 vertically. Hidden in a box is the bumble or a butterfly. You provide the x,y coordinates to locate the hidden object. The difference in the two games is the way clues are given. Find the Bumble uses arrows to point up, down, left or right, while Butterfly Hunt uses word clues.

Visit From Space uses a 5-by-5 grid of numbers to assist you in locating Bumble's cousin from space. This time the character is hidden where two lines intersect and, again, you must choose the correct coordinates for the intersections and are provided with word clues when your guess is incorrect. Tic Tac Toe is also a game of coordinates; however, this one is for two players. The object, of course, is to place four dots in a row before your opponent does.

Bumble Dots is the last game. Here you play a dot-to-dot game by either selecting one of Bumble's pictures or by creating one of your own for someone else to play. Selecting one of Bumble's pictures displays one dot at a time, and you must provide the correct x,y coordinates for each dot. Clues are provided with each incorrect guess. As each dot is named, it is connected to the other dots until a complete picture is drawn. If you choose to create your own picture, you are asked how many dots and the location of each. You may name your picture and save it so that it may be used in a later game.

If you have Extended BASIC 1.0, you may receive an SN error when running *Bumble Games* after power on. Typing `RUN` again will cure the problem. This is not stated in the manual, but I found it in both *Moptown* manuals. *Bumble Games* provides excellent practice in learning how to plot coordinates.

*Moptown Parade* and *Moptown Hotel* form a series of 11 different games using creatures called Moppets. *Parade* is for ages 6 to 10, and *Hotel* is for ages 8 to 13. The games are progressively more difficult. They are used to teach patterns, similarities and differences.

Moppets have four different traits: tall or short, thin or fat, red or blue, and bibbit or gribbit. A bibbit has a long nose; a gribbit has no nose but instead has a curly tail. The simplest game is Make My Twin where you describe a moppet with the same traits as one displayed. The hardest is Moptown Hotel. Here you have 16 squares in a 4-by-4 matrix. Two players alternately place moppets into adjacent squares. The catch is — each moppet placed must be different from all those adjacent, by two traits. This becomes more and more difficult as more moppets are placed. Even adults may find this one a real challenge.

The *Moptown* series is a delight to use. My 9-year-old really enjoyed them. These games are a great way of teaching the concepts of "same" and "different."

The Learning Company series is a fun way to teach young children, providing a challenge and yet still remaining fun. They would make a nice addition to anyone's library of educational software.

**(The Learning Company, 545 Middlefield Rd., Suite 170, Menlo Park, CA 94025; 415-328-5410; *Magic Spells* $34.95; Moptown Parade and Hotel, $39.95 each. Available in Radio Shack stores nationwide.)**

**— Larry Birkenfeld**

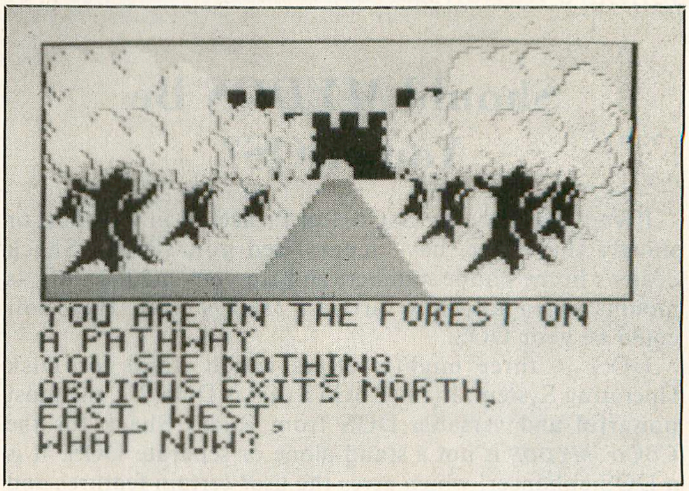
# *Dragon's Castle* — A Bargain Basement Adventure

*The Dragon's Castle* by Mitchell Software is a graphics Adventure, using four-color, medium resolution graphics, for all Color Computers. It is written in BASIC, runs slowly (unless you have a CoCo 3 and use `POKE 65497,0` to run double speed), is fairly easy to solve, has a limited vocabulary, and does not allow the player to save a game. Most importantly, both the graphics and the plot could stand a major improvement.

Yet, in spite of these drawbacks, *The Dragon's Castle* is worth consideration. This game is by no means "state of the art," nor is it baffling. But it is fun to play. Thus, for those of you wanting the thrill of Adventure, but with budgetary restrictions, *The Dragon's Castle* might be something to consider.

The game is available on an unprotected disk or cassette, and it loads easily. You use two-word commands, such as `LOOK ALTAR`, `USE SWORD`, or `TAKE BOOK` to tell the computer what you want to do. The top half of the screen presents a graphic view of where you are (in `PMODE 3`, or four-color, medium resolution graphics), while the bottom half of the screen presents short, nondescriptive statements telling you where you are and asking for your command. Your quest is to rid the princess' castle from the big, bad dragon. You'll also have to fight a few other meanies, as well as avoiding the Elvish Imp, a dastardly kleptomaniac.

*The Dragon's Castle* is fairly easy to solve. It will probably take the average Adventure player only five hours to finish. Most of the puzzles are unremarkable, and the limited vocabulary doesn't give one a great deal of freedom.



```
YOU ARE IN THE FOREST ON
A PATHWAY
YOU SEE NOTHING.
OBVIOUS EXITS NORTH,
EAST, WEST,
WHAT NOW?
```

Still, the game isn't all that bad, and I did enjoy playing it. I'm not going to recommend it to most. I personally would rather save up my money and spend $35 on a really good Adventure than $15 on a couple of minor ones. Yet, if you've been yearning for some adventure and don't have tons of money, you might find *The Dragon's Castle* to be what you're looking for.

**(Mitchell Software, P.O. Box 194, Tomahawk, WI 54487; 715-453-4204, $14.95 plus $1.50 S/H)**

**— Eric W. Tilenius**

*Two-Liner Contest Winner . . .*

This little wonder lets you enter sound values, play them and even print them out. Just enter the pitch value and length for each note. Make sure not to use a value greater than 255.

**The listing:**

```
1 CLS8:PRINT@32,"INPUT SOUND&LEN
GTH. EX: 10,10.  WHEN DONE, INPU
T 999,999.":DIM A(250),B(250):FO
RT=1TO250:PRINT@128,"#";T;:INPUT
A(T),B(T):IF A(T)=999 THEN GOTO
2 ELSE NEXT
2 PRINT@128,"            PLAYBACK
":FOR N=1 TO T-1:SOUND A(N),B(N)
:NEXT:PRINT@128,"PRINT (Y/N):";:
INPUTP$:IF P$="N" THEN RUN ELSE
FOR N=1 TO T-1:PRINT#-2,"#";N;"
 ";A(N);",";B(N):NEXT:RUN
```

*Matthew Coenen*
*Norwalk, IA*

(For this winning two-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

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# Should *MYDOS* Be Your DOS?

If you bought your CoCo 3 in Princeton in October, or shortly thereafter, have memorized your Radio Shack dealer's home phone number, and rip your mailbox off its mounts when RAINBOW arrives, *MYDOS* from Hawksoft could be your DOS.

DOS — three mighty letters which stand for Disk Operating System. In the CoCo 3 that is DOS 2.1, the most powerful and versatile DOS from Radio Shack for the CoCo. *MYDOS* is not a stand-alone or separate DOS. It is a DOS enhancer, which gives the user certain features and capabilities that the CoCo does not have without it. *MYDOS* is a very useful extra for the CoCo and, in spite of a few drawbacks, is well worth the price.

*MYDOS* adds the following features to the CoCo 3:

1. Supports J&M disk controller printer port.
2. Resets drive heads to Track 0 to prevent "head banging" on power-up.
3. Provides clear-reset function for a software cold restart.
4. Utilizes Radio Shack Speech/Sound cartridge.
5. Utilizes mouse control.

*MYDOS* also adds these six commands to disk BASIC:

1. Lcase on/off switches in and out of lowercase
2. Mdir gives a mouse controlled execution directory
3. Mouse on/off provides a very powerful input option
4. Voice on/off echoes all input to speech cartridge
5. Say "Your input" or Say AB$ voice output
6. Xrun "program.bin:1" &H1000 uses same syntax as `LOADM` and `EXEC`, with the allowance of a drive specifier and a memory offset location.

On the whole, *MYDOS* works very well. However, there are a few drawbacks that I did want to mention. First, Lcase shows you lowercase letters, but converts them to uppercase for the CoCo, so for real lowercase letters you must use the SHIFT-0 combination.

The Mouse command gives the user a double row of punctuation, numbers and letters (the keyboard) plus a BREAK, ENTER and CLEAR icon across the top of the screen. Input is handled by moving a mouse or joystick to the desired letter, and clicking. The letter becomes lowercase if the cursor is on it, which takes a little getting used to. Numbers and punctuation are in inverse video. This is a very powerful input device, particularly for editing. I can see the non-typists and handicapped users finding this feature very helpful. The drawbacks: Only the right mouse/joystick port is active, and there is no keyboard input possible while in Mouse mode. Therefore, you must find and click Mouse Off to exit this feature! Even reset will not dump you out of it.

Also, with Voice On, the computer says every word that is input. Most of these features work all the time, and all work with BASIC (Xrun works with machine language), but *MYDOS* does have a few quirks: The Mouse command will not work with all programs, and Xrun will not run and load all programs. The arena seems to be applications programs; for instance, *VIP Desktop* cannot be Xrun, and Mouse and Voice do not work. However, another product for the CoCo 3, a graphics Adventure, worked under Xrun. I suspect the culprits here are certain memory locations used by machine language programs. If the user has a particular application in mind to use with *MYDOS*, he would probably want to check on that particular software package for compatibility.

> **"MYDOS *is a DOS enhancer, which gives the user certain features and capabilities that the CoCo does not have without it."***

One really nice feature of *MYDOS* is the customization routine. This gives you the choice of which disk controller you are using, screen display, prompt display, power up and reset messages, and speech synthesizer on or off.

All in all, this is a very handy and useful product for the price. I would recommend the EPROM option only after using the disk version to see if the EPROM would suit your needs. If it would, perhaps multiple DOS users would find this an exceptional product indeed, particularly with its low price.

The documentation is very straightforward, easy to read and easy to follow. One final note about *MYDOS*: It arrived from the U.S. Postal Service with the disk folded, spindled and mutilated, and the EPROM pins mangled worse *after* they had been poked through the disk. Chris Hawks, owner, author and programmer of Hawksoft and *MYDOS* respectively, had new materials to me in 24 hours with a very courteous note. He even followed up with a newer revision of the documentation a few days later. Therefore, I must add excellent product support to *MYDOS*'s qualifications.

**(Hawksoft, 307 Sexauer Ave., Elgin, IL 60123; 312-742-3084, $15 disk only, $35 disk and EPROM.)**

**— Jeffrey S. Parker**

*One-Liner Contest Winner . . .*

This one is for all of us who can't afford the cost of a trip to Egypt.

**The listing:**

```
10 CLS:PRINT"WELCOME TO EGYPT...
":PMODE2:PCLS:DRAW"BM128,60;NG12
0F120":FORI=60TO190STEP10:LINE(3
,I)-(251,I),PSET:NEXT:PAINT(0,0)
,,5:SCREEN1,1:E$="T5L4DEL2FEDL4P
29DEFAEFD":F$="P7FGAAAAAGEFGGGGG
F":SONG$="XE$;XF$;XE$;P1":FORI=0
TO1STEP0:PLAYSONG$:NEXT
```

*Calvin Barnett*
*Ft. Meade, FL*

(For this winning one-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape*.)

# Old Favorites in a *Super Collection of Super Games*

Mikaron's *Super Collection of Super Games* may be a welcome change from the common joystick shoot-'em-ups or the recent fad of graphics Adventure games. Nothing in this group is really new, but the price is low (averaging a little over $4 per game) and there were no real "bugs" found. There are some problems: On a CoCo 3, use of reset to change artifact colors crashes the program, and attempts to Quit a game to go to another often require having to do a cold start. However, the overall programming and debugging quality is good, and most users will have few complaints.

The six games on the disk include:

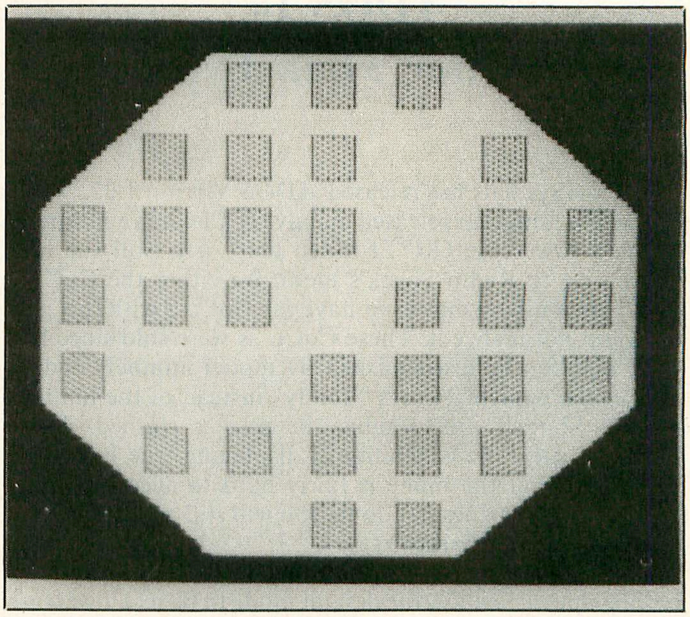
4-in-a-Row, a 3-D version of Tic Tac Toe. It is well-done and challenging, and can be played by two players or you-versus-computer. Red and blue were not easily discernable on a monochrome monitor, but if you have a color TV or a color monitor you should enjoy this one.

CoCo Cube is a form of Rubik's cube for computers. Again, the use of a monochrome monitor is not recommended. I must, however, compliment the author for a superb Rubik's tutorial. His help screens are probably worth the price of the entire disk.

63 Puzzle is a larger version of the old number scramble puzzles that were a craze in the fifties. One attempts to rearrange numbers from a random to a non-random order using specified sliding moves.

Super Color Match is a similar concept using colored blocks.

One Peg is a game in which you remove pegs that have been jumped over, while trying for an order that leaves only one peg on the board — hopefully in the selected spot. You may have seen this type game in plywood on the table at diners or bars where service is unusually slow.



Progressive Puzzle is also one in which the order of moves is critical. In this version, Red can only move certain ways and Black can only move in the opposite direction. The object is to exchange the location of all Red pieces for all Black pieces in a minimum number of moves.

In summary, these games are all old standbys, but they are well-done and the package price is low.

**(Mikaron Software Company, P.O. Box 1064, Chester, CA 96020; $24.95 plus $.50 S/H)**

**— H. Larry Elman**

---

*Two-Liner Contest Winner . . .*

Here's a little something for you '60s music lovers.

**The listing:**

```
1 A$="O2L8BO3CO2BL2O3DP255L4.DP2
55DP3L8CDCDL4.FP4L8DCDCL4O2BP8L8
BO3CO2BL2O3DP255L4.DP255DP3L8CDC
DL4.FP8L8DCDCL4O2BP8O3L8EF7G7FL4
EL8F+G9A9GL4F+L8O2BO3CO2BO3DO2L4
.GL8B-L4O3CL4.O2BP4P8":D$="O3L8G
CO2AO3CFCO2AO3CGCO2AO3CFCO2AO3C"
:'A HARD DAY'S NIGHT
2 B$="O3L8DL4GL8F+L1F+L8G7EP255L
4EL8F+GL4F+P255L8F+L2.F+P2L8DL4F
+L8GL1GP255L8G7EP255L4EL8F+L4GL1
AP255L4.AP255L8AP8":C$="O2L8BO3C
O2BO3DL4.O2GL8B-L4O3CL8O2L4.BP5L
8BO3CO2BL2O3DP255L4.DP255D":X$="
XA$;XA$;XB$;XA$;XA$;XB$;XA$;XC$;
XD$;XD$;":PLAYX$'GOICURIA
```

*Eddie Goicuria*
*Malden, MA*

(For this winning two-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

---

*Two-Liner Contest Winner . . .*

Just type this one in and run it for a small sample of your CoCo's sound capability.

**The listing:**

```
0 CLS:FORN=1TO42:READA,B:SOUNDA,
B:NEXTN:END:DATA176,6
10 DATA176,6,170,3,176,3,185,6,1
76,3,159,3,176,6,176,6,170,3,176
,3,185,3,176,3,147,3,159,3,159,3
,133,3,147,3,159,3,147,6,133,3,1
25,6,125,6,147,3,147,3,108,3,125
,3,133,3,147,3,159,6,170,3,176,6
,176,6,170,3,159,3,147,3,125,3,8
9,3,58,6,58,6,78,3,89,9
```

*Matthew McGinnis*
*Terre Haute, IN*

(For this winning two-liner contest entry, the author has been sent copies of both *The Second Rainbow Book of Simulations* and its companion *The Second Rainbow Simulations Tape.*)

# *ADOS* Is Better Than Ever

SpectroSystems has released *ADOS* Version 1.02. While this new version was released mainly for CoCo 2s containing the new lowercase 6847T1 video chip, it is still the best alternative to Radio Shack's BASIC for either the CoCo 1 or 2. Some of you may even have the CoCo 2 with this new chip and not realize it. These CoCo 2s were sold since late 1985 and can be distinguished by model numbers ending in a B; the nameplate says "Tandy" instead of the familiar "Radio Shack," and, finally, the zero is slashed. These machines have the capability of displaying true lowercase characters, but the mode is fairly hard to access. Simply typing `SHIFT-0` does not do it. You will still get the inverse-video uppercase characters.

The new *ADOS* allows you to access this mode and 1.02 has the option to allow the default mode to be real lowercase characters. Also with the new CoCo 2, *ADOS* can provide an all-green background with no black border, or an all-black background, along with the standard display with the black border. With the standard screens, *ADOS* 1.02 still has all the enhancements the earlier version included. A few small changes have occurred, but first, let's cover the enhancements in case some of you are not familiar with *ADOS*.

In general, *ADOS* is a version of Color Disk Extended BASIC 1.0 but with many added enhancements that were seemingly overlooked by Tandy. After you use *ADOS* for a while, you will think they had to be overlooked, because they sure are handy. First, *ADOS* may be used as a disk utility, to be loaded in whenever it is needed or it may be burned into an EPROM. The EPROM replaces the ROM inside the disk controller. In either case, you can modify *ADOS* to your individual needs. The EPROM option is the most recommended since *ADOS* will always be there when you turn on your CoCo. *ADOS* was well-designed in that there are few incompatibilities. SpectroSystems does not offer *ADOS* on an EPROM, but they do furnish you with information to have an EPROM burned if you do not have access to that capability. You really need to play with *ADOS* for a few weeks before you have it burned into an EPROM. You will probably change your own version several times before you get it just the way you want it.

The features of *ADOS* include repeat and edit of the last direct-mode command, control key entries, automatic line number prompts, and the ability to enter commands in either lower- or uppercase. There is a DOS command for booting up OS-9, error-trapping, a one- or two-column directory with free grans to the screen or printer, an enhanced copy command, an AE error override option for Copy and Rename, and a `RUNM` command to load and execute an ML program.

Also included: RAM command to convert to all-64K RAM mode and a ROM command to convert back; a Scan command to list ASCII files or give start, end and EXEC addresses for binary files; a PRT on/off for routing text to printer or screen; a mini-monitor for hexadecimal memory examination and changing; and a command for viewing memory.

Also included is the customizing utility to define control key abbreviations, printer baud rates, disk step rates and disk access time, and 35- or 40-track drive support.

You have the option to support single-sided, double-sided or the combination of both types of drives. A high resolution text screen driver that gives a 24 line by either 42, 51 or 64 columns is included on the disk.

> ***"Once you have* ADOS *at your fingertips, you will wonder how you got along without it."***

Other programs on the disk include `NUTRAX.BIN`, `WP64A.BIN` and `BOOT.BAS`. The `BOOT.BAS` utility allows you to run any program on a disk by using the up- and down-arrow keys to select the program. I renamed this program `X.BAS`, put it on all of my disks and defined one of my control keys for `RUN"X"`.

`WP64A` is a modified version of PBJ's *Word-Pak* boot. It corrects some conflicts with the use of the down arrow key by both *ADOS* and *Word-Pak*. *ADOS* uses the down arrow as a control key.

The `NUTRAX` utility allows you to convert your 35-track disks into 40 tracks by formatting the upper five tracks and adjusting the GAT while leaving the contents of the original 35 tracks intact.

Another feature is the ability to modify the start-up logo. I suggest you modify it with your name; this will help serve as a form of theft protection when *ADOS* is burned into an EPROM. You can even give a short message stating the modified version of *ADOS* in case you have different EPROMs.

Overall, anyone with a disk drive should not hesitate to get this one. You will not fully appreciate it until it is burned into an EPROM, but, even as a disk utility, I would recommend it. Once you have *ADOS* at your fingertips, you will wonder how you got along without it. The documentation is very clear but, should you have a problem or any questions, you can call Art Flexser. You will find him very helpful and friendly. I give *ADOS* five stars and recommend you get it soon.

**(SpectroSystems, 11111 N. Kendall Dr., Suite A108, Miami, FL 33176; 305-274-3899, $27.95 plus $2 S/H)**

**— Dale Shell**

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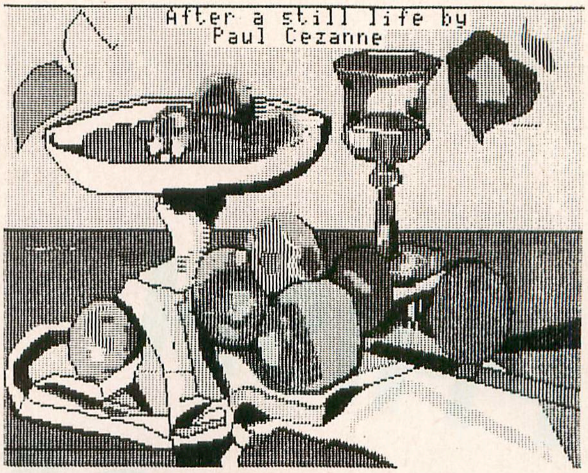

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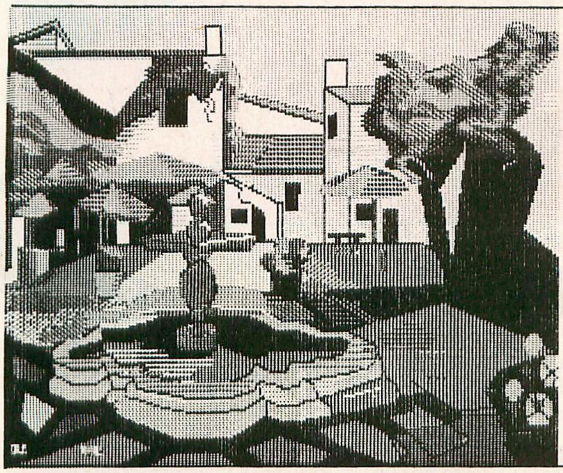

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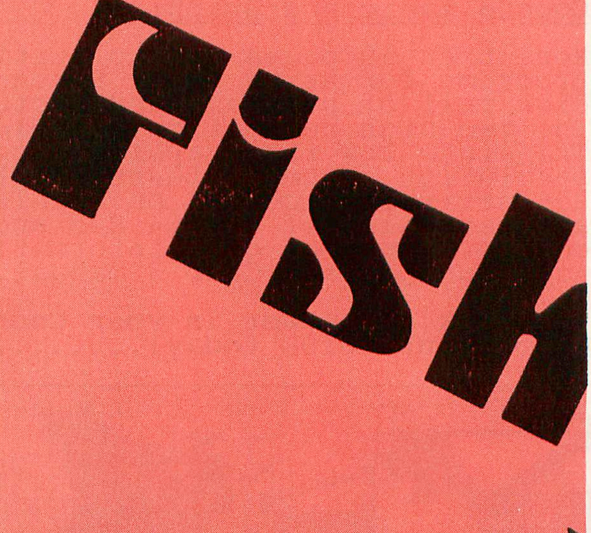
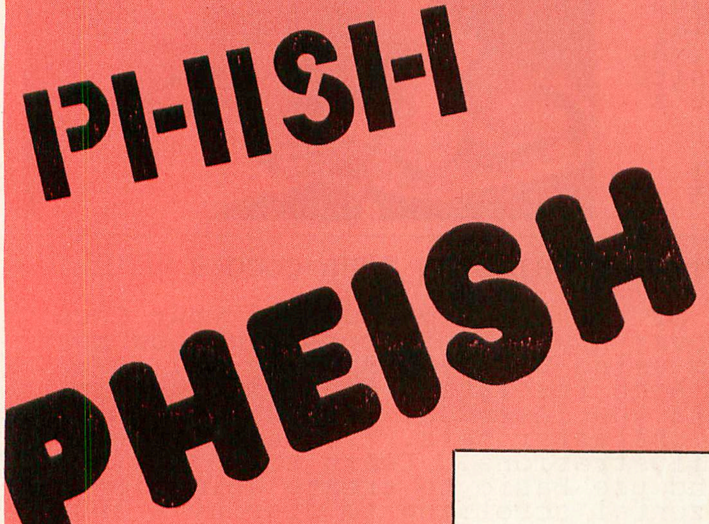
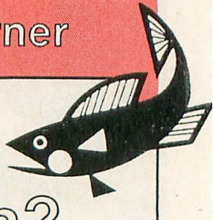
OS-9
BASIC09

RAINBOW ON DISK ONLY

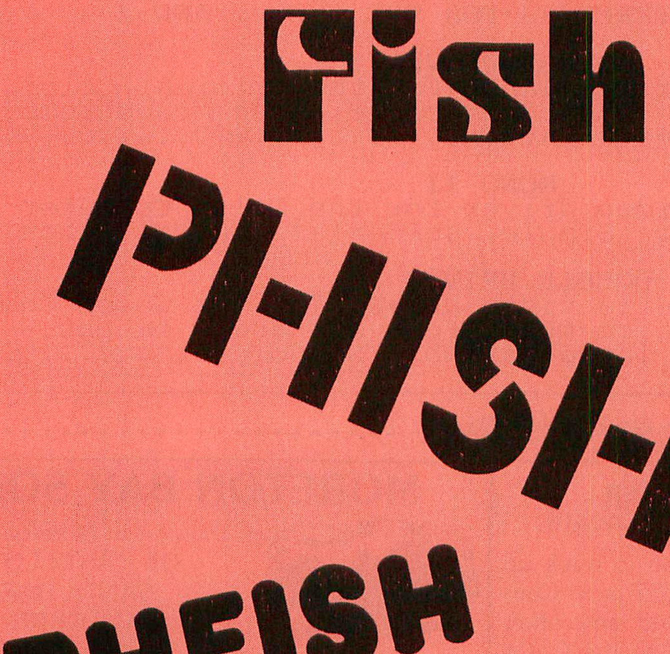






### By Del Turner

# Is it a Fish or a Phish, or a Pheish?



The modular quality of BASIC09 lends itself to the kinds of things teachers like to do with computer programs. The idea of merely amending a data procedure to get a new set of questions is right in line with teaching practice. The word study program *Sound Puzzles* allows just that.

Four sets of words are called from the menu (procedure `mmenu`), but more are available by adding to the menu options, or by even introducing a second or third page of menus. Only one of the data sets has been fully developed as a procedure (procedure `one`), but data for three other sets of words are provided. All you need to do is change the data in `one` and then rename it to `two`, `three` or `four`.

If you are not familiar with BASIC09, a few development hints are in order. The steps go something like this:

*Del Turner is an elementary school principal who programs for the CoCo and MS-DOS machines. He is also a proprietor of Thompson House Educational Programs.*

1) Fire up OS-9 and then call BASIC09.
2) Enter the editor by typing `e soundpz`.
3) Enter each line of the procedure by moving one space from the margin and by typing in the characters required by the listing.
4) Quit the editor by typing `Q` (if you have errors, they will be shown to you at this time if not already noted).
5) Correct any errors you have made.
6) Save the procedure to /d0 (for example) by typing `save soundpz`.
7) Return to Step 1 to type in another of the procedures.

You can test your progress once you have the first five procedures (`soundpz`, `printat`, `notes`, `title` and `mmenu`) saved to disk. Clear your workspace by typing `kill*`, which kills all procedures in memory. Now, load the five procedures back into the workspace and type `run soundpz`.

But let's go back a bit. A couple of items in the first five procedures might have gotten by you if you are used to Extended Color BASIC. The `printat` procedure is a handy one you will use in many programs. Without the `PRINT@` of Extended BASIC, you need a way of placing the cursor where you want it.

Another item quite different from Extended BASIC is the use of graphics characters right from the keyboard, similar to a Commodore 64. The blue square, or `CHR$(175)`, is produced under BASIC09 by pressing the @ key plus O, which prints out in the listing as a black square. This technique is used in the title procedure and in the screen procedure. Then there is the command for clearing the screen, which is `PRINT CHR$(12)`, and `CHR$(7)`, which gets a beep. Did you notice the neat way of handling the menu selections using the `REPEAT-UNTIL` loop?

The next three procedures (`screen`, `nowgo` and `one`) will have to be typed in, debugged, and saved to disk before you can finally see the whole thing at work. Once you have them safely saved, you can reload them into the workspace and give them a run by selecting Choice One from the menu when it prompts you. An important thing to remember is that *you must have lowercase enabled.* All answers are expected to be in lowercase! Now, it may be that the workspace will be so full that things won't run unless you call for more memory. Type `mem 7000` and that should do the trick for you. If not, go for more memory.

You can finish the job by typing in procedures `two`, `three` and `four` using the same listing as procedure `one` only with the different sets of data statements.

When all is done, you can "pack" the procedures and have them called from the `CMDS` file where you will find them after the packing process. With your unpacked versions loaded into the workspace, pack the first four procedures under the `soundpz` title by typing `pack soundpz, notes, title, mmenu`. Pack the `printat` procedure by itself. Then pack two more under the screen title by typing `pack screen, nowgo`. Finally, pack each data procedure separately. Type `pack one`, then `pack two`, and so forth.

Your disk will now have two full sets of the procedures: one in the /d0 directory and one in the `CMDS` directory. The packed version will take less memory to run and can be called while in BASIC09 by typing `run soundpz`, or when in OS-9 by typing `soundpz` alone. The unpacked version in the /d0 directory can be listed to the screen or, even better, to the printer, to be arrayed in a pretty style like the one shown below. To get such a listing to the printer, load the procedure desired into the workspace from the /d0 directory and then type `list soundpz>/p`, for example. Note that you may save all procedures in the workspace under one title. For instance, with all procedures in place, type `save* soundpz` to have them all saved under the title `soundpz`.

The educational value of the program is unique because it deals with a persistent problem we have with English language spelling. Although there are some rules that work to tell us when to choose a certain phoneme (e.g., i before e except after c), more often there are no rules to guide us. Yet, 36 percent of all spelling errors occur not when a phoneme is misspelled, but when the wrong phoneme is chosen. The first step in learning how to tackle such words is to recognize that it is not a rule we need, but practice in replacing incorrect phonemes with correct ones. In other words, dealing with the errors we make is the best way to learn.

As to how to expand the program, you could look at improving the procedures themselves, maybe adding a border to the title, or other print graphics additions. The content of the lessons leaves lots to be done, as only four of a possible 47 phonemes of the English language have been tackled. If you want to deal with a tough phoneme set, try getting involved with the sound of "o" as in boat and you will find 23 possibilities (a, o, i, y, ei, oi, ai, eo, he, iu, au, ah, u, e, ea, ou, ie, io, ia, eau, oa, iou and ough). No wonder people have trouble learning to spell in English! ☐

---

*(You may direct questions about this program to Mr. Turner at 2305 Greenfield Ave., Kamloops, British Columbia, Canada V2B 4P5. Please enclose an SASE when expecting a reply.)* ☐

**Editor's Note: On RAINBOW ON DISK, The following procedures will be combined into one source file. All you will need to do is enter `load soundpuz` at the BASIC09 prompt after entering `BASIC09 #7K`.**

**The listing:** `soundpz`

```
PROCEDURE printat
PARAM col,row:INTEGER
PRINT CHR$(2); CHR$(col+32); CHR$(row+32);
END


PROCEDURE notes
PRINT CHR$(12)
RUN printat(0,0) \ PRINT "SOME NOTES:" \ PRINT
PRINT "PHONIC SUBSTITUTIONS WHEREBY A  SOUND IS SPELLED CORRECTLY YET  IT IS THE WRONG FORM FOR
THE    WORD, ACCOUNT FOR 36% OF ALL    ERRORS MADE. NO OTHER ERROR IS  AS FREQUENT!"
PRINT  \ PRINT "FEW RULES WORK IN SUCH CASES,   SO THE PROGRAM MERELY ATTEMPTS  TO HAVE THE STUD
ENT SEE THAT    IT IS A MATTER OF RESPONDING    TO THE NATURE OF THE ERROR."
PRINT  \ INPUT "PRESS <ENTER> TO CONTINUE...",a$
```

```
PROCEDURE mmenu
DIM choice:INTEGER
REPEAT
PRINT CHR$(12) \RUN printat(11,2) \ PRINT "M E N U"
RUN printat(8,4)
PRINT "1. e sound as in bed"
RUN printat(8,6)
PRINT "2. a sound as in cat"
RUN printat(8,8)
PRINT "3. e sound as in we"
RUN printat(8,10)
PRINT "4. a sound as in name"
PRINT
5 INPUT "       ENTER YOUR CHOICE...",choice
UNTIL choice>=1 AND choice<=4
IF choice=1 THEN 100
IF choice=2 THEN 200
IF choice=3 THEN 300
IF choice=4 THEN 400
100 RUN one
200 RUN two
300 RUN three
400 RUN four


 PROCEDURE one
 DIM count,i:INTEGER
 DIM mess1,mess2:STRING[30]
 DIM sentence:STRING[30]
 DIM errorw:STRING[15]
 DIM correctw:STRING[15]
 count=0
 DATA "The e sound as in bed"
 DATA "e ie ea ai u a ay eo ei ae"
 DATA "He sed he would return.","sed","said"
 DATA "Tom will gat it.","gat","get"
 DATA "There are too meny!","meny","many"
 DATA "Run it agen.","agen","again"
 DATA "The box is hevy.","hevy","heavy"
 DATA "Is that ther house?","ther","their"
 DATA "Are there eny left?","eny","any"
 DATA "I ment to clean my room.","ment","meant"
 DATA "I've red that book.","red","read"
 DATA "The colour is yallow.","yallow","yellow"
 count=count+1 \ IF count>1 THEN 5
 RUN screen
 READ mess1
 READ mess2
 score=0
 5 FOR i=1 TO 10
 READ sentence
 READ errorw
 READ correctw
 RUN nowgo(mess1,mess2,sentence,errorw,correctw,score)
 NEXT i
 RUN printat(0,4)
 PRINT "                                   ";
 PRINT "                                   ";
 INPUT " DO YOU WANT TO PLAY AGAIN?",a$
 IF a$="n" THEN 100
 RUN soundpz
 100 BYE



PROCEDURE screen
PRINT CHR$(12)
RUN printat(0,0)
PRINT "*SOUND PUZZLES*  SCORE:          ";
RUN printat(7,4)
PRINT "error:"
FOR count=0 TO 31
PRINT CHR$(58);
NEXT count
RUN printat(2,6)
```

```
PRINT "correction:"
RUN printat(0,9)
PRINT "                                   ";
PROCEDURE title
DIM phoneme:STRING[4]
DIM count,h,v:INTEGER
count=0
h=0
v=0
PRINT CHR$(12)
DATA "a","au","ai","e","ee","ea","ei","ie"
DATA "i","eo","oe","ay","ey","y","ae","is"
DATA "a","ay","ey","eigh","ei","ea","ai"
DATA "aigh","ei","eue","ai","ewe","yew","iew"
REPEAT
h=RND(24)+2
v=RND(12)+1
READ phoneme
count:=count+1
RUN printat(h,v)
PRINT " ";
PRINT phoneme;
PRINT CHR$(7);
UNTIL count>29
RUN printat(8,5)
PRINT "                ";
RUN printat(8,6)
PRINT " SOUND PUZZLES ";
RUN printat(8,7)
PRINT "                ";
PRINT CHR$(7)
RUN printat(5,12)
INPUT "     PRESS <ENTER>...",a$
END


PROCEDURE soundpz
REM sound puzzle
REM by del turner
REM (c) october, 1986
REM os9 v.2 / basic09 v.1
DIM count:INTEGER
count:=0
count=count+1
WHILE count<2 DO
RUN notes
RUN title
count=count+1
ENDWHILE
RUN mmenu


PROCEDURE nowgo
DIM studentw:STRING[15]
PARAM mess1,mess2,sentence:STRING[30]
PARAM errorw,correctw:STRING[15]
PARAM score:INTEGER
RUN printat(0,11)
PRINT mess1
PRINT
PRINT "MAY BE WRITTEN THESE WAYS:"
PRINT mess2
RUN printat(7,2)
PRINT sentence
RUN printat(13,4)
PRINT errorw;
PRINT "                   ";
10 RUN printat(13,6)
PRINT "                   ";
RUN printat(13,6)
INPUT "",studentw
PRINT "";
IF studentw=correctw THEN 100
score=score-5
```

```
GOSUB 200
GOTO 10
100 RUN printat(7,2)
PRINT "                             ";
score=score+10
GOSUB 200
PRINT CHR$(7)
RUN printat(13,6)
PRINT "              ";
END
200 RUN printat(23,0)
PRINT "    ";
RUN printat(23,0)
PRINT score;
RETURN



PROCEDURE two
DIM count,i:INTEGER
DIM mess1,mess2:STRING[30]
DIM sentence:STRING[30]
DIM errorw:STRING[15]
DIM correctw:STRING[15]
count=0
DATA "The a sound as in cat"
DATA "a au ai"
DATA "Shail we all go?","shail","shall"
DATA "I caun do that.","caun","can"
DATA "Thainks for the help.","thainks","thanks"
DATA "I was born in Jainuary.","Jainuary","January"
DATA "The game is on Sauturday.","Sauturday","Saturday"
DATA "All begain to cheer.","begain","began"
DATA "I aim on the team.","aim","am"
DATA "My ant lives in Toronto.","ant","aunt"
DATA "The skirt was a plad one.","plad","plaid"
DATA "It was blaik as night.","blaik","black"
count=count+1 \ IF count>1 THEN 5
RUN screen
READ mess1
READ mess2
score=0
5 FOR i=1 TO 10
READ sentence
READ errorw
READ correctw
RUN nowgo(mess1,mess2,sentence,errorw,correctw,score)
NEXT i
RUN printat(0,4)
PRINT "                               ";
PRINT "                               ";
INPUT " DO YOU WANT TO PLAY AGAIN?",a$
IF a$="n" THEN 100
RUN soundpz
100 BYE



PROCEDURE three
DIM count,i:INTEGER
DIM mess1,mess2:STRING[30]
DIM sentence:STRING[30]
DIM errorw:STRING[15]
DIM correctw:STRING[15]
count=0
DATA "The e sound as in we"
DATA "e ee ea ei ie i eo oe ay ey y ae is"
DATA "The grass turned grean.","grean","green"
DATA "Thees are the ones!","thees","these"
DATA "eich child got a candy.","eich","each"
DATA "It is underneth the bed.","underneth","underneath"
DATA "I like it verie much.","verie","very"
DATA "She is fiftean years old.","fiftean","fifteen"
DATA "Reed that sign for me.","reed","read"
DATA "That is hard to beleive!","beleive","believe"
DATA "The answer is obveous.","obveous","obvious"
DATA "Did you receave a gift?","receave","receive"
count=count+1 \ IF count>1 THEN 5
RUN screen
READ mess1
READ mess2
score=0
5 FOR i=1 TO 10
READ sentence
READ errorw
READ correctw
RUN nowgo(mess1,mess2,sentence,errorw,correctw,score)
NEXT i
RUN printat(0,4)
PRINT "                                ";
PRINT "                                ";
INPUT " DO YOU WANT TO PLAY AGAIN?",a$
IF a$="n" THEN 100
RUN soundpz
100 BYE


PROCEDURE four
DIM count,i:INTEGER
DIM mess1,mess2:STRING[30]
DIM sentence:STRING[30]
DIM errorw:STRING[15]
DIM correctw:STRING[15]
count=0
DATA "The a sound as in name"
DATA "a ay ey eigh aigh ei ea ai et au"
DATA "Mey i go to the show?","mey","may"
DATA "I alweighs use salt.","alweighs","always"
DATA "How much do you way?","way","weigh"
DATA "He is ayght years old.","ayght","eight"
DATA "Give the apples aweigh.","aweigh","away"
DATA "It is all the saym to me.","saym","same"
DATA "He took aym, and fired.","aym","aim"
DATA "Snow meant slaighing.","slaighing","sleighing"
DATA "Miss Muffet ate her whay.","whay","whey"
DATA "He has a laim leg.","laim","lame"
count=count+1 \ IF count>1 THEN 5
RUN screen
READ mess1
READ mess2
score=0
5 FOR i=1 TO 10
READ sentence
READ errorw
READ correctw
RUN nowgo(mess1,mess2,sentence,errorw,correctw,score)
NEXT i
RUN printat(0,4)
PRINT "                                ";
PRINT "                                ";
INPUT " DO YOU WANT TO PLAY AGAIN?",a$
IF a$="n" THEN 100
RUN soundpz
100 PRINT CHR$(12)
BYE
```

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RAINBOWTECH

## DOWNLOADS

# The Breathing Video Display

### By Dan Downard
### Rainbow Technical Editor

*I am using a Zenith 1310PT television display. It "breathes" vertically as though the TV is in and out of sync with the CoCo vertical timing. This does not happen with other TVs, such as my Panasonic, which has a vert sync adjustment. What do you suggest?*

*Joseph P. Chidester*
*Owings Mills, MD*

Joe, it sounds as if you are getting RF interference into your TV set. As you know, the CoCo uses a clock frequency of .985 MHz, which is in the RF range. Harmonics interfere with your TV picture. The only sure way I know of curing the problem is installing a monitor adapter and using a monitor instead of a TV set.

There are a few more things you can try, though. First, try replacing the cable from the CoCo to the TV with coaxial cable, such as RG58/U. Make the cable long enough to coil about 10 turns of coaxial into a 4-inch circle. This will provide a little bit of attenuation of the harmonic signal.

Some people have even gone to the extreme of spraying the inside of the plastic cabinet with conductive paint. Be careful about flaking, since you may accidentally short out something on your circuit board. As with any type of electronic equipment, care should be taken to protect against possible damage to the components and the circuit board. Good luck.

---

### 8-Inch Drive Modifications

*I need information concerning hooking up an 8-inch disk drive (Model 801 Shugart ) to my old 'D' board CoCo with RS disk controller. Is it possible? If so, what changes need to be done to CoCo, controller (ROM Version 1.0) and drive? Is the 8-inch drive card edge similar to the card edge of my 5¼-inch drives?*

*Roger W. Donahue*
*Bristol, TN*

It is indeed possible to connect an 8-inch drive to your disk controller, Roger. An article appeared in *BYTE* magazine a few years back showing both the hardware and software required for this project. Unfortunately, the software was written for a 6502 microprocessor, but should provide a guideline for your effort.

I wouldn't recommend using the 8-inch drive, though. First of all, the standard IBM format for 8-inch drives is single density. You can actually store more information on a 5¼-inch, double-density floppy. Even if you are successful, severe compatibility problems will exist. That's the main reason 3½-inch drives have not become popular. They were just not like the rest of the CoCo world.

---

### Delphi Novice

*I am new to communications on the CoCo. I've been trying to use the Delphi network, but it tends to get a little confusing for a beginner. Could you tell me if there is any publication I could buy to help me out?*

*Stephen J. Benson*
*Everett, WA*

It sounds like you are on the right path already,Stephen, due to the fact that you wrote to "Downloads" using the electronic mail service provided by Delphi.

I am not aware of any publications that specialize in bulletin board communications, but be sure to read Cray Augsburg's monthly "Delphi Bureau" column. Cray is RAINBOW's Technical Editor and he offers easy-to-follow tutorials on using Delphi in his column.

The next time you are on CoCo SIG on Delphi,try typing `CO`. This will get you into the conference mode. There, you can carry on an electronic conversation with many of the editors and RAINBOW contributing authors. If they can, they will be glad to help you with any problems you are having. You can also type `HELP` at any prompt and receive an explanation of your options. See you on Delphi!

---

### Twice the Normal Speed

*I have a Color Computer 3, a Metric parallel interface and a Radio Shack DMP-200 printer. When the computer is operating at 1.78 MHz, what do I do to make the printer print legible information? It prints properly at the slower clock speed. Also, how reliable is disk I/O at the faster clock speed? I am using*

---

*Dan Downard is an electrical engineer and has been involved in electronics for 27 years through Ham radio (K4KWT). His interest in computers began about eight years ago, and he has built several 68XX systems.*

# Adventures 'R' Us

## Our Fourth Adventure Contest

Time passes quickly as you use your nimble fingers to escape the very passion that consumes you. Thoughts are fleeting at a time in which you need them most. The spidery web of mystery and intrigue you have spun is now entangling you. Every breath you take . . . Every move you make . . . Is it correct? Will it even accomplish the task at hand? Is there any time left?

No, we don't mean to imply time is nearly up for our Fourth Adventure Contest. Plenty of time remains. However, the final deadline for your entry in this contest is August 15, 1987 — a date that is rapidly approaching. So, you'd better get started soon, if you haven't already begun.

What? No ideas, you say? Just take a look around you! Your everyday life presents you with hundreds. Just sit down and start now! We await the very best you have to offer. If you want some pointers, check out "The Adventure Writer's Toolkit" (April 1985, Page 105) by Eric W. Tilenius. Or, for another helping hand, see "The Adventure Processor" (August 1986, Page 26) by Bill Cook. These articles, and many more, are just what you need to get started on the right track.

Your Adventure can be written for a 4K early model CoCo, or it can be written to take advantage of all the features in a 512K CoCo 3. It can be written under Disk BASIC, or it might be a creation in BASIC09.

---

**Judging:** The judges of the Fourth Rainbow Adventure Contest will be looking for several things in each entry. In addition to ensuring each submission is complete, they will consider the following:

- Originality
- Creativity
- Programming Efficiency
- Clarity of Instructions
- Ease of Use
- Vocabulary and Grammar
- Responsiveness
- Level of Challenge
- Enjoyment

The judges will also be concerned with the "publishability" of each Adventure. A shorter program is easier to fit into print (both in THE RAINBOW and any subsequent Adventure book) as well as being easier for the reader to type in. While the use of graphics tends to enhance any program, graphics are not necessary for an Adventure to win. The winning entry will be chosen for its unique appearance. Make your Adventure stand above the rest!

**RULES:** Your submission should include all programs and information needed to set up and run the Adventure. All programs must be sent on tape or disk with several saves of each program including at least one ASCII save. If an Adventure cannot be loaded, it cannot be judged. We will not type in even the shortest of programs! Hard copy of all program listings and instructions must also be included. If your Adventure uses machine language routines, *all source code*, as well as assembled object code, should be included on the tape or disk. Indicate the minimum CoCo system required to run your Adventure and include a complete solution!

Please, don't use packed lines that can't be LISTed or LLISTed for the benefit of our readers. Your program should run on standard Radio Shack equipment without requiring any special modifications and should not rely on commercial software for its execution. The only exception is the use of the OS-9 operating system (Level I and Level II) and BASIC09. If your Adventure uses graphics, make sure the graphics are self-contained. In other words, don't submit a program that loads several different graphics screens unless those graphics are created by a publishable program included in the submission.

In summary, send a complete package. Put the accompanying article, documentation, listings, complete instructions and solution, and cover letter on paper. Include your name, address and telephone number on each page of all materials. Be sure to write-protect your disk or punch out the tabs on your cassette to avoid accidental erasure, and label each with the name of the program(s) and your name and address. As in any contest, packaging does make a difference.

Your entry must be postmarked no later than August 15, 1987, in error-free condition. Each entrant will receive a free pass to the RAINBOWfest of his or her choice. You may also win one of the many prizes donated by our generous advertisers as well as have your program published in THE RAINBOW. So, get a move on! Write it up, put it together and send it to:

**Adventure Contest Editor, Rainbow Magazine, 9509 U.S. Highway 42,**
**P.O. Box 385, Prospect, KY 40059.**

**Additional Rules:** All entries must be original, unpublished and unmarketed works (no "conversions"). No programs that have been placed in the public domain are eligible. All entries become the property of Falsoft, Inc., publisher of the THE RAINBOW. The decisions of the judges will be final. Duplicate prizes will be awarded in the event of a tie. Winning entries will be featured in a future issue of THE RAINBOW.

**Prizes:** Following is partial list of the prizes the winners of our Fourth Rainbow Adventure Contest will be receiving. And, many more prizes are being donated each day!

| | | |
|---|---|---|
| **Tandy/Radio Shack** | DMP-106 Printer | $200 |
| **Tandy Home Education Systems** | VIDTEX | $30 |
| | Creative Exploration Series | |
| | Spectaculator | |
| | Hands On | $99 |
| | Problem Solving Series | |
| | Cooperative Strategy Series | |
| **Computer Island** | Chemistry Tutor | $30 |
| | Area & Perimeter | $20 |
| | Division of Fractions | $20 |
| | Quadratic Equations Tutor | $20 |
| | Distance Problems | $20 |
| | Cloze Exercises | $20 |
| | First Games | $25 |
| | The CoCo Wheel of Fortune | $20 |
| **Frank Hogg Laboratory, Inc.** | Inside OS-9 Level II (5 books) | $40 ea. |
| **Howard Medical** | Zenith 12" Amber Video Monitor | $150 |
| **HJL Products** | Softswitch Auto/Manual Printer Switch with cables | $140 |
| **Computize** | Color Max 3 (2 programs) | $60 ea. |
| **RAINBOW's Delphi SIGs** | Three five-hour free evenings in your choice of the CoCo or OS-9 Online SIGs. | $36 ea. |
| **Diecom Products** | Bouncing Boulders | $29 |
| | Caludril | $39 |
| | Lansford Mansion | $39 |
| **Computer Plus** | Color Computer 2 | $100 |
| **Derringer Software** | Pro-Color-Series Enhanced Version 2.1 | $80 |
| **Speech Systems** | Super Voice Speech Synthesizer includes Text-to-Speech Translator Program | $80 |
| **Tom Mix Software** | Worlds of Flight (2 programs) | $35 ea. |
| **Spectrum Projects** | Three Book Set:<br>CoCo III Secrets Revealed<br>The History of the CoCo<br>BASIC Programming Tricks | $50 |
| **CompuServe** | IntroPak — An Introductory Subscription (3 IntroPaks) includes $15 usage credit | $15 ea. |
| **Microcom Software** | Utility Routines Volume II | $30 |
| **Sugar Software** | Trig Attack | $20 |

*Teac 55 VB DS DD drives. I can't tell you people how much I look forward to RAINBOW Magazine and using RAINBOW's CoCo SIG. Thanks for any information and keep up the excellent work!*

*Andrew E. Stangel*
*Milwaukee, WI*

Since you are operating at a clock speed of twice the normal rate, Andy, you have to divide your delay constant by a factor of two. This is not the exact method of obtaining the constant, but it will work. For example, if you want 600 baud at a 1.78 MHz clock speed, use the constant for 1200 baud, or 41.

As far as high speed disk I/O, please read the following letter I received after my April column.

---

### Goodman's Response

*In the April "Downloads," you told Steve Zweitel that the CoCo 3's BASIC disk I/O should function at double speed. This is incorrect. In the* DSKCON *code (sector I/O) and in the* DSKINI *(format code) there are a number of places where delays allow data to "settle" in the Western Digital Chip after a command is sent to it. These delays end up being too short when the CoCo 3 is run at double speed. Unreliable disk I/O and unsuccessful formatting result. Art Flexser in* ADOS3 *and Steve Bjork in a program called* Disk Fix, *which he has posted on Delphi, have fixed these problems in the* DSKCON *and in* DSKINI *routines in Disk BASIC.*

*In another question, Mike Roush complained about a CoCo 1 with G and O key problems that got worse when he changed his old chicklet keyboard for a high-profile, CoCo 2 type keyboard. You advised him that the 6809 or the 6821 was likely to be at fault. Instead, this problem is due to a design flaw in the CoCo 1 circuit. The flaw consists of too big an RF limiting capacitor on the joystick firebutton lines (C57 and C58) on the old 'D' and 'E' boards. On some CoCo 1s, the value of .01 used causes the G and O keys to fail to work, because the pulses of the keyboard scan for those keys are getting shorted to ground by that improperly sized RF limiter capacitor. This problem always gets worse if the computer is run at a higher speed.*

*On Page 1 of Tandy Tech Tip for the Color Computer, Sheet CC:22 (a series of tech tips Tandy sends to their repair centers), Tandy advises that, in the course of installing any CoCo 2 keyboards, the C57 and C58 be replaced with .001mF capicators (instead of the .01s that were originally there). This fix always cures the missing G and O bug.*

*The report that dropping in a CoCo 2 type keyboard exacerbated the problem is probably explained by some physical effect (increased resistance? added capacitance?) caused by the membrane connector used by those keyboards.*

*As you are well aware, I advise against anyone running their CoCo 1 or 2 at any of the high speed pokes.*

*It is remotely possible that swapping keyboard 6821 (as you recommended) might fix the problem, for the problem may appear only with some 6821 chips and not others. But such a fix is a poor one, for even when working, the system will be marginal and vulnerable to "relapses." The cap replacement is really the right approach.*

*Marty Goodman*

Marty, as always it is good to hear from you. I agree that high speed disk I/O is undesirable, but it does work on occasion. As far as the timing problem associated with keyboard malfunctions, I agree that this is probably the problem. Thanks for your input.

---

### Multi-Pak Does the Job

*Can you use a modem, disk drive, a printer and* MikeyTerm *all at the same time? I have a CoCo 2 and a Multi-Pak interface. I also have an RS-232 program card. Can I disable the internal terminal program in the card to use it that way?*

*Willis Calvert*
*Avenel, NJ*

You just have to plug the RS-232 card into your Multi-Pak, Willis. The rest of the details are accomplished by the software. If you don't have a Multi-Pak, you may have to disable the ROM, due to address conflicts.

---

### C on Level II

*I plan to buy OS-9 Level II when it becomes available, but I was wondering if it will be possible to use Level I C under OS-9 Level II? If not, will it be possible to get an upgrade to OS-9 Level II C without having to just flat out buy it at full price?*

*J. Michael O'Connor*
*Austin, TX*

Fear not, Mike, your Level I C package will run just fine under Level II. I tried it and it works.

---

### Needs More Space

*A few months ago, I asked about extending the space between the CoCo and the Multi-Pak. I am again toying with an idea to "clean up" the look of my computer room. My hope is to remove the CoCo motherboard and the Multi-Pak board and enclose them in a PC-style case. In order to do this, I would have to mount one board over the other, so enough room is left for drives. Since my letter to you, I have now seen cables being advertised in the RAINBOW to exend the distance between the CoCo and the MPI. Do you feel that a mere 2 to 3 inches would be allowable?*

*Eric A. Canha*
*Fairhaven, MA*

I don't see anything wrong with a short extension, Eric, but I wouldn't recommend it unless it was absolutely necessary.

---

**Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.**

**Your technical questions may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type** `ASK` **(for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "Downloads" online form which has complete instructions.**

## RAINBOWTECH

## OS-9 LEVEL II

# Exploring Level II's New Features From BASIC09

### By Rick Adams

Several articles in THE RAINBOW have given examples of how to access the new windowing features of Level II via `display` commands and the `wcreate` (window create) command. But BASIC09 users under Level II have an even more powerful interface with OS-9's new windowing and graphics capabilities — the GFX2 module.

The GFX2 module is the BASIC09 programmer's friend. It provides an easily-remembered method for accessing special display functions. To clear the screen, for example, everybody knows (or do they?) the command `PRINT CHR$(12)` will do the trick and that `PRINT CHR$(7)` causes the terminal to beep. But this is a rather obscure, "system-freaky" way of performing what really should be a straightforward operation.

Enter our friend GFX2. From a BASIC09 program, if you want to clear the screen, use the command `RUN GFX2("clear")`. If you want to beep the terminal, use `RUN GFX2("bell")`. The GFX2 module takes your description of what you want done and generates the proper display codes.

Experienced BASIC09 users will recognize that GFX2 works the same as the GFX module that came with OS-9 Level I. A Level II system also comes with the GFX module, but GFX2 provides an additional bag of tricks, via which your BASIC09 programs can now activate literally dozens of new and amazing functions available under Level II.

---

*Rick Adams (Delphi username RICKADAMS) is a UNIX systems programmer who enjoys using and writing software for his CoCo 3. He, his wife, Alice, and their two children live in Rohnert Park, California.*

Take a look at the BASIC09 program shown in Listing 1. This program clears the screen (sound familiar?) and then turns on a new feature in Level II OS-9 called the "graphics cursor."

The graphics cursor is a little arrow that moves around with your joystick and points to anywhere on the screen. In this sample program, pressing the firebutton on the joystick causes a circle to be drawn on the screen, with the center of the circle at the place the graphics cursor was pointing to when the firebutton was pressed.

Let's do a few setup operations so we can be ready to type in and run the example program given in Listing 1. We need to set up a high resolution graphics screen for the program to run in, make sure the GFX and GFX2 modules will be available for BASIC09's use, and use the `stdptrs` file to pre-define our graphics cursor.

Either type these commands directly into OS-9 or create a "command file" (using `build` or your favorite editor) containing them:

```
wcreate /w1 -s=5 0 0 80 24 1 0 0
merge /d0/sys/stdfonts >/w1
merge /d0/sys/stdptrs >/w1
display 1b 3a c8 01 >/w1
echo Window /w1 >/w1
shell i=/w1&
```

Run these commands to set up window w1 for our BASIC09 program. Then press the CLEAR key to go to the next window. You should see an 80-column screen containing white letters on a blue background. If you are using an RGB monitor, you will need to enter `montype r` at the OS-9 prompt.

The `wcreate` command created the window and the window color set (white on blue, with blue border). The `merge` of the `stdfonts` and `stdptrs` files to the window defined the text font and the graphics icons to use when drawing a graphics cursor. The `shell` command created a new OS-9 shell to run your OS-9 commands in the new window.

Now that you have taken up residence in your new window, w1, it is time to make sure that BASIC09 will be able

**Diagram of pointer icons in `stdptrs` file:**

**Group 202 buffer 1 — pointer arrow:**

```
.*......
***.....
.***....
..***..*
...*****
....****
....****
...*****
```

**Group 202 buffer 2 — pencil:**

```
****............
*.*.*...........
**...*..........
*.....*.........
.*.....*........
..*.....*.......
...*.....*......
....*.....*.....
.....*...*.*....
......*.*...*...
.......*...*....
........*.*.....
.........*......
```

to find the GFX and the GFX2 modules when it needs them.

Many people customize several versions of their working OS-9 disks, trimming all files that are useless for a particular application to conserve disk space. If you have customized your working Level II disks to the point that GFX and GFX2 will fit in the `CMDS` directory, it would be a good idea to copy these files into `/d0/CMDS`. BASIC09 looks for these files in the current execution directory if it can't find them in memory. Obviously, it would also be a good idea to put BASIC09 itself into the `/d0/CMDS` directory, too!

Otherwise, you may use the `load` command to load the GFX and GFX2 modules (as well as BASIC09) into memory from disk. These modules will most probably reside on your second Level II disk as `/d0/CMDS/gfx`, `/d0/CMDS/gfx2`, and `/d0/CMDS/basic09`, respectively. If you have two disk drives, you can pop that other disk in Drive 1 and type:

```
load /d1/CMDS/gfx
load /d1/CMDS/gfx2
load /d1/CMDS/basic09
```

If you only have one drive, swap that disk in place of your Level II commands disk (and, substitute `d0` for `d1` above). The `load` module is already in memory, so you can load those modules, then swap back the original disk, with no ill effects.

Finally, it's time to fire up BASIC09. When BASIC09's title page appears, type `e circles` to begin entering the program in Listing 1. Enter each line from the listing carefully, beginning each line with a space so that BASIC09 understands that each of the lines is to be entered as a line of your program, instead of being interpreted as a BASIC09 editor command.

When the final `end` command has been entered into the program, type a `q` at the left margin to exit the BASIC09 program editor. At this point it would be a good idea to save your work:

```
save* circles
```

If all has gone well up to this point, type `run circles` to start the program. The screen should clear, and a little arrow should appear on the screen. Move the arrow around with your joystick, and then press the firebutton to put a circle on the screen. Move somewhere else and put another circle on the screen. Hold the firebutton down and move the joystick as the drawing of circles auto-repeats.

The graphics cursor is visible as a little arrow. The data that defined the shape of this arrow was loaded into memory when you used the `merge` command to merge the contents of the `stdptrs` file (the "standard pointers" file) with the window. More on that later.

Notice you didn't have to do anything to prevent the moving cursor arrow from wiping out what it moves over. OS-9 automatically takes care of that detail for you.

The GFX2 calls to "curoff," "clear" and "bell" are used to turn off the cursor, clear the screen and make a little beep sound, respectively. The GFX call to "joystk" will be familiar to those who have used the GFX module under Level I BASIC09. So far, things look fairly straightforward. But there are a few GFX2 calls in there that bear explaining. Let's take a look.

The "gcset" call turns on the graphics cursor. The "putgc" call tells OS-9 to move the graphics cursor to the specified X and Y coordinates. You are not telling BASIC09 to do it; the OS-9 operating system itself is doing all the work. If you interrupt the program, the graphics cursor will still be there on the screen. As a matter of fact, the graphics cursor will stubbornly stay on the screen even if you exit BASIC09!

The "setdptr" call sets the display pointer (the screen position used as a reference point by many of the graphics commands) to the specified X and Y coordinates. The "circle" call to GFX2 uses this point as the center point of the circle it draws. The number 80 in the "circle" call establishes a circle radius of 80.

Now, what is this about the "standard pointers" file? Are there several pointer icons in this file? Yes, there are, but to access them, we're going to have to explore the inner workings of Level II OS-9 in a little more detail.

The definition of pointer icons for the "graphics cursor" is a specialized application of a facility called "get/put buffers." Get/put buffers, when loaded into memory, are referenced by two numbers that describe which buffer "group" to use, and which "buffer" within that group.

All of the pointer icons in the `stdptrs` file are referenced as get/put Buffer Group 202. Within that group, there are seven buffers, numbered 1 through 7, each containing a pointer icon.

Thus, in the "gcset" call in Listing 1, notice that the pointer icon we are

**Group 202 buffer 3 —
cross-hairs:**

```
......**........
......**........
......**........
......**........
......**........
......**........
......**........
****************
****************
......**........
......**........
......**........
......**........
......**........
......**........
......**........
```

**Group 202 buffer 4 —
"system busy" icon (hourglass):**

```
****************
.*............*.
..*..........*..
...**********...
....********....
.....******.....
......****......
.......**.......
.......**.......
......*..*......
.....*.**.*.....
....*......*....
...*...**...*...
..*...****...*..
.*...******...*.
****************
```

**Group 202 buffer 5 —
"illegal function" icon:**

```
.....*****......
...**.....**....
..*.........*...
.*.........***..
.*........**.*..
*........**...*.
*.......**....*.
*......**.....*.
*.....**......*.
*....**.......*.
.*..**.......*..
.*.**........*..
..**........*...
...**.....**....
.....*****......
```

telling OS-9 to use is in Buffer Group 202, Buffer Number 1. This is the picture of the little arrow we have seen. (To turn off the graphics cursor, use another "gcset" call to set the graphics cursor to Buffer Group 0, Buffer Number 0.)

Just for fun, change that call to use Group 202, Buffer 2, instead of Buffer 1. The next time you run the program, the little arrow pointer will be replaced with a little picture of a pencil. More fiddling will reveal each of the other pointer icons. Note that one of the pointer icons is an hourglass, with sand running through it. This will no doubt be used by Multi-Vue as a "system busy — please wait" icon, just like on the Macintosh.

Speaking of which, it seems fairly obvious that a *MacPaint*-like program would be remarkably easy to program in BASIC09 using these tools. Perhaps such a program may someday be written and placed into the public domain. Perhaps you, brave RAINBOW reader, might be the one. But, at the very least, here is a demonstration program to play and experiment with. Happy exploring!

**The listing:** `Demonstration`

```
PROCEDURE circles
 0000       DIM firebutton,xval,yval:INTEGER
 000F       RUN gfx2("curoff")
 001D       RUN gfx2("gcset",202,1)
 0030       RUN gfx2("clear")
 003D       LOOP
 003F         RUN gfx("joystk",0,firebutton,xval,yval)
 005F         xval=xval*10
 006A         yval=(63-yval)*3
 0078         RUN gfx2("putgc",xval,yval)
 008F         RUN gfx2("setdptr",xval,yval)
 00A8         IF firebutton<>0 THEN
 00B4           RUN gfx2("circle",80)
 00C5           RUN gfx2("bell")
 00D1         ENDIF
 00D3       ENDLOOP
 00D7       END
```

**Group 202 buffer 6 —**
**"insert" function cursor:**

```
********
...**...
...**...
...**...
...**...
...**...
...**...
********
```

**Group 202 buffer 7 —**
**"plus sign" cursor:**

```
...**...
...**...
...**...
********
...**...
...**...
...**...
........
```

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Killer Mansion
College Adventure
Coco-Terrestrial
Escape
Zector Adventure
Skid Row
Quest
Naughide
Haunted House

#5 Business Helper
Workmate
Word Processor
Spread Sheet
Calendar
Accounts Receivable
Accounts Payable
Income Property
Mail List
Small Business Helper
Stock Charting
Job Log
Asset Manager

#6 Games
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Galactic Conquest
Warlords
The Power Sword
Steps
Robot Bomber
Force Field
Rat Attack
Caterpillar Cave
Meteor

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ML to Data
High Text Mod.
High Text
Program Packer
Easy Basic
Key Repeat
Full Screen Editor
ROM Copy
Basic RAM

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## BITS AND BYTES OF BASIC

# Getting Started With BASIC09

### By Richard A. White
### Rainbow Contributing Editor

About a year ago, I did a column on BASIC09, but then got distracted by other topics including the CoCo 3. Obviously, there has been much interest in the CoCo 3, and many older CoCos have been retired in favor of the new machine. However, the earlier machines will be around for years, and RAINBOW needs to meet the needs of these owners as well as the CoCo 3 Community.

BASIC09 works on all machines running OS-9. Programs written on one machine are easily portable to others. The main changes needed may be screen formatting, although many BASIC09 utilities make minimum use of the screen and run unchanged on a CoCo 1 or 2 even if written on a machine featuring 64- or 80-character displays. Obviously, an application written on a CoCo 1 or 2 will run unchanged on a CoCo 3, provided any system calls are supported in both environments. Since I do not propose to use system calls, the programs in this column will work in any CoCo under OS-9 Level I or II.

At this writing, OS-9 Level II is imminent. Perhaps this is good so I can focus on BASIC09 and not be distracted. We understand that BASIC09 is included with Level II OS-9 at $79.95. This puts CoCo 1 and 2 owners who are considering moving to OS-9 Level I and BASIC09 in a quandary. BASIC09 for Level I sells separately for $99.95. With Level I OS-9 priced at $69.95, There is a $90 difference that could be applied toward a CoCo 3. For a serious CoCo 1 or 2 owner, this must make an upgrade tempting.

Level I BASIC09 comes with four files on the disk. Let's start with BASIC09. This is the software development program and includes a syntax-checking line editor, a workspace for storing source code procedures, an Execution mode to run procedures, and a debugger. To load and run BASIC09, it should be copied to your current `CMDS` directory. This way you can boot and then type `ex BASIC09` and be up and running in BASIC09. I have a short startup file, called `b09`, in the data directory of my system disk that runs BASIC09:

```
EX BASIC09 #14K < /TERM
```

This executes BASIC09, sets workspace memory at 14K bytes and routes input from the keyboard. At this point, the user is in the System mode, which accepts various file-handling commands for dealing with files within the workspace. These commands load them from disk and save them to disk. All of these files are ASCII source code, which means they can be listed from OS-9 or loaded into another editor. From System mode, any procedure in the workspace can be run.

Since I have made it a point to describe these files as source code, you might infer there is some other type of BASIC09 procedure file. You are right. Source code files will generally be kept in a data directory. But from the workspace, source procedures can be packed and saved to disk, generally to a `CMDS` directory. When a procedure is packed, all keywords and variable names are removed and numeric tokens and addresses are substituted in their place. `REM`s are totally discarded when a procedure is packed. How much memory is saved depends on how wordy the source code was. If you use one- or two-letter variable names and dispense with remarks, the savings may be less than 20 percent. If your code uses long and meaningful variable names and is well-remarked, savings could approach 50 percent. I have verified the space savings many times. I have not seen that packed code is noticeably faster, but I may not have used the right applications.

A packed procedure may be run either from BASIC09 or from OS-9. It cannot be loaded into the workspace any longer, but can load into available memory outside BASIC09. If the procedure is being run from OS-9, it first causes the interpreter procedure `runb`, which must be in the `CMDS` directory, to load and execute. To run a packed procedure in your `CMDS` directory, type its name just as you would type `dir` or `list`.

There are two other procedures on the BASIC09 distribution disk. `Inkey` is a machine language procedure that gets a character from a given path, generally the keyboard, and returns it in a variable that has been supplied as a parameter when `Inkey` is run. `Inkey` must be in the `CMDS` directory or have been loaded into memory. The Graphics Interface Module, GFX, is a CoCo-specific machine language module that provides color graphics commands. Like `Inkey`, it should be in your `CMDS` directory from which it is easily loaded into memory from OS-9, or it will be

---

*Richard White lives in Fairfield, Ohio, has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the co-author of the* TIMS *database management program.*

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### The WIZ

By Bill Brady

**The Wiz** is the **First** and **Only** program designed for the CoCo III that uses **WINDOWS!** The Wiz is a smart terminal and communications program for the CoCo III and OS9 Level II. Making use of multiple windows and overlay windows with pop up dialog boxes The Wiz really shines. Features include: Autolog- lets you configure The Wiz's colors, characters boldface etc., Xmodem and text send and receive, sleep mode, conference mode uses a separate window for your text, usage log and much more. Does not work with the CoCo's internal bit banger serial port. The complete package includes a special ACIA driver that allows baud rates from 300 to 19,200 baud. Requires the RS232 pak or the Disto RS232 or similar port plus a CoCo III with OS9 Level II.

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automatically loaded the first time it is referenced from a procedure. I expect the Graphics Interface Module to change dramatically for Level II to use the CoCo 3's new graphics modes.

To review, the four files supplied with BASIC09 should be copied into your `CMDS` directory. This may be on your normal system disk or one you make specially for use when working with BASIC09. BASIC09 is started by typing `ex BASIC09 #XYK`, which loads the procedure, gives it an XYK workspace and executes it. The source procedures that you write using the editor are ASCII files and should be saved to a data directory. Source code can be loaded back into BASIC09 for further editing. Packing strips the words from the procedure, which is then saved to disk, preferably to the `CMDS` directory. Packed code cannot be reloaded into the workspace so be sure to save your source code before packing the procedure(s).

Now that we are set up to use BASIC09, what should we use it for? In July 1981, when RAINBOW's first issue came out, about the only way to make a CoCo do anything was to write a BASIC program. The history of other machines is similar. Now it's 1987 and software abounds to do most things we need. What will we use BASIC09 for? The answer lies in those speciality tasks that cannot be done well in a word processor, spreadsheet, file program or other existing software. We need to remember that setting up an application in a spreadsheet or file manager is programming as well.

An example is a rank and awards program I wrote for a local Scout troop. I could not program a file or spreadsheet program to print the kind of reports I wanted. That may be an overstatement. I did not see how I could make the software I owned do this. I knew generally how to go about the task in BASIC09, and it turned out to be rather easy to do. There will always be special tasks that require special software.

Another use of BASIC09 is simple to learn to program. Understanding how a program works helps one understand computers in general. The career implications of such understanding cannot be understated. And many concepts learned on a CoCo are easily transferable to other machines. A friend sold his employer on purchasing a Tandy 6000 with a Xenix operating system to run a multi-user lab management system based in large measure on his understanding of OS-9 running on his CoCo. The 6000 is in place and running well because so much of his OS-9 knowledge was was transferable to Xenix.

OK, but why learn BASIC09? Isn't BASIC good enough? BASIC is good enough for many quick programs geared to do some specific task. I have written some rather large BASIC programs, so I am well aware of its shortcomings. But, rather than fault BASIC, let's look at some BASIC09 strengths.

Line numbers place some severe limits on BASIC. Preferably, BASIC09 is written without line numbers. One immediate benefit is that almost any amount of code can come after a `THEN` in an `IF-THEN-(ELSE)-ENDIF` structure. This eliminates the need to branch somewhere else in the program to get space for a substantial routine. This greatly facilitates structured, top-down programming where you can read the program listing from top to bottom without jumping around.

BASIC09 supports a variety of control structures including `IF-THEN-(ELSE)-ENDIF`; `FOR-TO-(STEP)-NEXT`; `WHILE-DO-ENDWHILE`; `REPEAT-UNTIL`; and `LOOP-ENDLOOP` with `EXITIF-THEN-ENDEXIT`. Each of these work somewhat differently, giving the programmer a selection of tools, one of which is likely to do their specific job.

While you can use `GOTO` and `GOSUB` to numbered lines in BASIC09, the ability to run named BASIC09 and machine language procedures is much more straightforward and powerful. When you run a procedure, you give it only those variables it needs. If you inadvertently re-use a variable name in the called procedure that you used in the main program, no harm is done since variable names are local, not global, as in BASIC.

BASIC09's handling of variables is like a compiled language rather than like an interpreted language. There is no string space management, as in BASIC. The programmer must decide how long a string will be and then tell BASIC09 using a dimensioning statement. Once a variable is dimensioned, its storage space is allocated and fixed, whether it contains data or not. Thus, variable length strings pose a problem.

Otherwise, BASIC09 has an extremely powerful variable typing system that is a major contributor to its speed. In the numeric domain, BASIC09 supports `BYTE`, `INTEGER` (two byte) and `REAL` variables. `BYTE` and `INTEGER` variables save memory and compute very quickly. `REAL` variables are floating-point variables that use more memory and compute much more slowly. For most program control purposes, `BYTE` and `INTEGER` variables are preferred. If you need to run a `FOR-TO-NEXT` loop 10 times, an `INTEGER` does the job and does it faster than a `REAL` would. There is also a `BOOLEAN` type that carries either a true or a false. But this is only a starter. BASIC09 supports arrays and complex data structures:

```
DIM name(30,3):STRING[20]
```

This is a dimension statement. It tells BASIC09 to allocate storage to an array called `name` that will have 30 sets of three variables, each of which will be 20 bytes long. This can be viewed as defin-

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ing 30 records of three, 20-byte fields each. These might be first, middle and last name. Many of the programs I have written deal with records with multiple fields.

Actually, using a simple array to define fields in a record is very limiting. Further, the fields are identified by a number that is not very enlightening to someone else reading the program, or even to the original programmer when he wants to modify the program. BASIC09 lets you build extremely complex record structures using the `TYPE` statement. Since `TYPE` is very powerful, it is also a bit difficult to understand at the beginning. We will take it slowly.

Here is a restatement of the name array using `TYPE`:

```
TYPE full_name = first_name,
middle_name,last_name:
STRING[20]
DIM name(30):full_name
```

`TYPE` creates a new data type called `full_name` that has three fields called `first_name`, `middle_name` and `last_name`. Each field is a `STRING` 20 characters long. `TYPE` does not allocate any variable storage space. This is done in the next line where an array of 30 members having the type `full_name` is dimensioned.

What if you did not want to store the full middle name, but only the middle initial? Let's change the `TYPE` statement:

```
TYPE full_name = first_name,
last_name:STRING [20];
middle_init:STRING[1]
DIM name(30):full_name
```

The manual says new data types are defined as "a one-dimensional array of previously defined types." At this point, `full_name` is a previously defined data type and can be used in another `TYPE` statement:

```
TYPE member = name:full_name
;address:STRING[24];telephone
:STRING[8]
DIM entry (200):member
```

You might want to set up such a structure to handle entries in a membership list. However, you would also want a few more fields in the record. City, state and ZIP code would be needed at minimum. What about an expiration date? How about a few fields for notes or other data? Perhaps a business phone would be useful; the telephone fields may need to be 12 characters long to include an area code. Try your hand at writing a `TYPE` statement that includes these added fields.

A word about the ZIP code field. A ZIP code is a number, and you may be tempted to make it an `INTEGER` type to save memory. But, ZIP codes range up to 99,000 plus, which is well outside the 32,767 range of `INTEGER` variables. Your choices are to make the ZIP code a `REAL` or leave it a `STRING`. I would do the latter. You can still sort on ZIP code, which you would probably want to do, and get the list in proper ZIP code order.

When you use `TYPE` variables, you need to access fields by their names:

```
entry(22).address := "44 Dow
Ct."
```

This puts the address "44 Dow Ct." into the address field of `entry(22)` record. Since "name" is really two-deep, assigning a last name looks like this:

```
entry(22).name.last_name :
= "White"
```

One of the neatest things about these complex data structures is you can send the whole record or array to disk and get it back with single statements. Further, the whole structure is saved as a direct memory dump making the whole operation fast. `PUT #path, entry` saves the whole array to disk, while `GET #path,entry` loads *it into* memory.

Memory is what puts a limit on how big the data structure can get. In my Boy Scout awards program, the structure includes name, patrol, date joined, a 12-member array for skill award dates, a 120-member array for merit badge dates and a 10-member array for rank dates. The size of the structure is over 1,000 bytes, but this is no trouble since only one member is in memory at a time.

Last, but not least, when you dimension a variable, that variable is *not* automatically initialized. When the program is run, BASIC09 assigns memory space to the variable and whatever is in that area at the time is in the variable. So, let's initialize the `entry` array:

```
FOR count=1 TO 200
  entry(count).name.first_name
  :=""
  entry(count).name.middle.
  init:=""
  entry(count).name.last_name
  :=""
  entry(count).address := ""
  entry(count).telephone := ""
NEXT count
```

This puts a null into each field and provides another example of how to access individual fields.

Next month, we will start developing a name, address, telephone and other data program that can be used for rosters, printing mailing labels and a variety of other related needs. Because of the modularity of BASIC09, a basic file structure and data entry/edit program can be written with various application modules added later to do jobs not anticipated.

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## KISSable OS-9

# Shooting for a Standard

### By Dale L. Puckett
### Rainbow Contributing Editor

We've been helping Bill Brady beta test *Wiz*, his OS-9 Level II terminal program, for several months now, and it just keeps getting better. In the latest edition, he has implemented VT-52 emulation. You might ask what advantage this has for a Color Computer user. I did!

"You and I may not use it too much, but the people who like to play online games like Delphi's *Flight Simulator* will love it," Brady said. "It will also be a great feature for people who need or want to talk to VAX or several of the other minicomputers or mainframes."

I checked out the VT-52 by exercising it with Red Ryder running on the Macintosh. It worked great.

After we discussed the pros and cons of a VT-52 emulation mode in a CoCo terminal program and Brady threw out a few plugs for his "alt g" function that lets you create and use a graphics screen while online, the conversation turned to *CoCoBin*, an excellent addition to the Xmodem file transfer standard. I suggested the name to Brady after we compared it to *MacBinary*, a similar standard used by both the MAUG on CIS and the Delphi's Macintosh ICONtact. *MacBinary* and *CoCoBin*, if we can pull together and make it a standard, give us a way to transfer binary files to another computer with all the file's attributes intact.

For example, when you download a program from MAUG or ICONtact with a Macintosh, the terminal program gives your new file the name of the original file. At the same time, it transfers all the data in what Apple programmers call the resource fork of the file. This fork often contains icons that visually identify the program and other resources that make a program look like a Macintosh program.

*CoCoBin* works by appending an extra block to the beginning of a file. That block contains the OS-9 unique information that we find in the file descriptor including the size of the file and the security attributes such as `d`, `s`, `e`, `pe`, `w`, `pw`, `r` and `pr`.

Brady hasn't finalized the convention for putting the filename in, but he is working on it. The major question *CoCoBin* must answer is what it should do with a file when it reads in a name from another computer that already exists in its own current data directory.

In *MacBinary*, the authors give the new file the same name with a `.1` appended to it. Brady does it the same way in his initial implementation, and it seems to solve the problem nicely. Keep in mind the module name inside will come from the module name within the file being received so it will not be affected.

*CoCoBin* does not presently have the automatic filename feature, but Brady hopes to include it in the near future. That feature alone makes *MacBinary* a dream to use.

"The ultimate objective is to send any file and have it end up at the other end with exactly the same name and all the attributes of the original file," Brady said. "With straight Xmodem you must fill the data at the end and all the other attributes are left to the beck and call of the programmer."

*CoCoBin* will be needed to handle the new data types that we will be seeing with OS-9 Level II, namely fonts. Who knows, when *Multi-Vue* arrives we may even be able to transfer a program's Icon. Let's take a closer look at the *CoCoBin* standard.

With the advent of OS-9 Level II for the Color Computer 3, new data types, fonts, are possible in the OS-9 file system. Additionally, when any file traverses the Xmodem send/receive cycle, and that file is not exactly divisible by 128, the Xmodem block size, fill data is appended by the sender. Traditionally the fill has been removed by either passing the file through the OS-9 verify utility or by loading it into memory and re-saving it in another file. Unfortunately these steps only work with files that contain loadable modules, i.e., those prefaced with 87CD. Text files can be repaired with any text editor. None of these methods will work for fonts, since they are neither 87CD prefaced modules nor straight text files. It would aid inexperienced operators if the file could be traversed with as little modification as possible, for all type of files. Therefore, it is proposed that a new subset of the Xmodem protocol be created that shall be called *CoCoBin* and be defined as follows:

A single Xmodem block shall be sent in preface to Xmodem transfers. This block shall contain information needed to remove the fill at the end of transmission. On upload, the operator will be given a choice of straight Xmodem upload or *CoCoBin* upload. If *CoCoBin* is selected, the sending Xmodem will preface the actual file data with a block that contains the following information:

---

*Dale L. Puckett, who is author of* The Official BASIC09 Tour Guide *and co-author, with Peter Dibble, of* The Official Rainbow Guide to OS-9, *is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale is a U.S. Coast Guard lieutenant and lives in Rockville, Maryland.*

| XMODEM 132 Byte Block #1 *CoCoBin* | OS-9 FD Definition |
|---|---|
| Byte 1 SOH (01) | |
| Byte 2 Block # (01) | |
| Byte 3 Block MOD(256) | |
| Byte 4 ATTR byte (usually (07)) | FD.ATT |
| Byte 5 OWNERmsb (usually (00)) | FD.OWN |
| Byte 6 OWNER lsb (usually (00)) | |
| Byte 7 YEAR (87)($57)(Date) | FD.DAT |
| Byte 8 MONTH (03) (Last Modified) | |
| Byte 9 DAY (02) (Sent) | |
| Byte 10 FILE SIZE mmsb | FD.SIZ |
| Byte 11 FILE SIZE msb | |
| Byte 12 FILE SIZE 1sb | |
| Byte 13 FILE SIZE 11sb | |
| Byte 14 YEAR | FD.DCR |
| Byte 15 MONTH | |
| Byte 16 DAY | |
| Byte 17-131 NOT YET DEFINED | |
| Byte 132 Checksum | |

After this block is sent, data transfer will continue in the customary fashion, with the next block labeled as Block 2. This method, while requiring pre-knowledge on the operator's part, both for upload and download, is transparent to the host computer. On download, the receiver must know in advance that the file is in the *CoCoBin* format. The receiving Xmodem will then decode the file size — the most useful piece of information — and use it in the following ways:

- Display to the operator the number of blocks forthcoming in the transmission.
- May also use the the total blocks/received blocks to drive a percent complete indicator.
- Will discontinue writing data to the incoming file when bytes received equals the file size (`fd.siz`) effectively "stripping the fill."

After this use, the receiving Xmodem will discard the *CoCoBin* block (Block 1) and save all subsequent blocks to the file.

The opportunity still exists for other information to be included in the not yet defined bytes (more than 100) of this block. Responses are encouraged and should be sent to "KISSable OS-9" at RAINBOW. We will forward them to Bill Brady. If you would like to discuss it with him online, you can reach him at any of the following addresses: CIS, 70126,267; Delphi, WBRADY; Genie, W.BRADY. Or you may write him at 4776-B Carmody Court, Harwood, MD 29776.

*CoCoBin* is already a feature of *Wiz*. It is up to us to make it a standard. If we do develop this standard and encourage both the CIS and Delphi OS-9 SIG SysOps to adopt it, we will find life much easier when it comes to binary data file transfers.

**Paul Searby Continues to Support OS-9**

During Color Expo '87 we jumped at the chance to interview Computerware's Paul Searby. Computerware was one of the first companies to support OS-9 users, and they have stuck with us through thick and thin. When Searby addressed the OS-9 Users Group Breakfast at RAINBOWfest, Palo Alto, nearly a year and a half ago, he made a strong plea for software developers to write intuitive programs that are easy to use. We thought this would be a good time to get a progress report.

*Dale*: What's changed since Palo Alto?

*Paul*: For a long time the real concern and the nagging question was, "Is there going to be a Color Computer market?" Then in late July and early August we picked up a fairly strong sense that there was really going to be a Color Computer 3. Later in the fall we were able to get a copy of OS-9 Level II through a non-disclosure agreement, and we started to verify that everything we had published worked on the new machine and started to develop a *WordStar*-like word processor, *Screen Star*.

*Dale*: I hear you have a new terminal package.

*Paul*: Yes, we also ported our complete *Color Connection* terminal package, and it now works on both OS-9 Level I and Level II. It gives the Xmodem protocol, the CompuServe B Protocol, as well as standard Xon/Xoff data transfers. It works at 1200 baud using the bit banger port on the CoCo 1, 2 or 3. We tried to supply the features people have requested. It is menu-driven, supports auto-dialing, has built-in macros and can capture ASCII files larger than your buffer. It works consistently on RS-DOS, Level I and Level II.

We wrote our own driver to let it work at 1200 baud. In fact, we have actually merged it into the program. It links with the *Color Connection* when you load it and unlinks when you exit. We have merged our device driver and descriptor with the program code. When you load one, you load them all. We also added a rather large buffer in the driver so that when *Color Connection* says stop, we won't lose any data from the host Q even if the host doesn't stop quickly. With both the *Color Connection* and *Screen Star*, we have provided our own screen driver for OS-9 Level I, Version 2.00.00. It gives a 51-by-24 display and reverse scrolling, a feature that isn't available in the Radio Shack drivers. We use the stock OS-9 windows on the Level II versions.

*Dale*: How close is *Screen Star* to *WordStar*?

*Paul*: First, you must remember that the Color Computer keyboard is different in a number of ways. The cursor and SHIFT keys are a problem area. On the Color Computer they actually generate a control sequence, and you can stumble into a conflict if you aren't careful. And sometimes, you can't make the keyboard do exactly what you want it to. There is a system call that lets you check to see if the SHIFT or CONTROL key has been pressed at the same time as a cursor key. We are using it and it has helped a lot.

*Dale*: Is *Screen Star* WYSIWYG?

*Paul*: We are not supporting the full left and right justification feature of *WordStar* within the editor. Rather, we are putting it in a package with our text processor. You can load the text processor from your disk or have it in memory on an OS-9 Level II system. We have added a help menu and a spelling checker. The help menu gives you a preview of the text formatter commands. You can run *Screen Star* in one OS-9 Level II window and keep the text processor running in another. If you don't want to open another window, you can exit *Screen Star* and then run the text formatter. Later on, we hope to release an enhanced version that more closely merges *Screen Star* with the formatter. Registered users can upgrade at nominal prices.

*Dale*: Have you added anything to *WordStar*?

*Paul*: There's an interesting set of menus called the parameter menu, 10 function keys, one through nine. You can run any other OS-9 program from within *Screen Star* and when you return, your cursor will be positioned just where it was when you left. You can toggle the help messages on and off by pressing a single control character. We are supporting the lock functions, find/replace functions and we let you use the "?" wild card with the find and replace commands.

*Dale*: How much does it cost?

*Paul*: It sells for $49.95; a bargain considering it was all written in assembly language. My philosophy, all along, has been to keep our software affordable. For $79.95 you get *Screen Star*, the speller and the formatter. We also believe in very reasonable upgrades and have carried many customers through three or four upgrades for $10 or $15 each on a $100 package. For example, a Level II update for *Databank* will only cost $15. It has been modified so the same version works on both Level I and Level II. It can even determine the size of your window.

*Dale*: Why a *WordStar* clone?

*Paul*: A lot of people have already been exposed to *WordStar* at work. This means they are already familiar with it and will enjoy working with the same command set at home. Other people can learn it on the Color Computer and then apply their skills at work. It gives them the opportunity to pick up the feel of a very expensive MS-DOS package at a very reasonable price. Besides, when you get down to it, *WordStar* commands are logical.

*Dale*: Is *Screen Star* hard to learn?

*Paul*: The manual is well-organized. In the first few pages, you learn all you really need to know. I try to learn a command a day. Or during one week, I concentrate on a single command. When you work this way, you slowly but surely wind up knowing most of the command set.

*Dale*: How much memory does *Screen Star* take?

*Paul*: The program is only 7K long. In fact, we will probably be able to provide all of our enhancement in a single OS-9 Level II 8K block. If we do go over the 8K boundary, once we receive the real Level II documentation, we will really be able to knock your socks off.

*Dale*: What's next for Computerware?

*Paul*: I would like to get the company back in the database area. But, any new product must be different from *Profile* because we have licensed that program to Tandy.

*Dale*: Having any trouble moving up to Level II?

*Paul*: We have been using it for years on other machines so it is an elementary move for us — a matter of building the system disks.

*Dale*: How do you like Level II?

*Paul*: Well, quite candidly, we need an interrupt-driven disk driver. You can have all the power in the world, but if you can't get at the keyboard when you need it, it doesn't work. Yet, I have been doing a lot of consulting and it's the best that's out there.

*Dale*: Does OS-9 Level II have any shortcomings?

*Paul*: It's not quite as user-friendly as it could be. For example, the BASIC `copy` command should have wildcards. Also, Microware should offer a `backup` command that supports downloading from a hard disk to a floppy. There are some pieces of the system that are still needed to put a pretty face on OS-9. Some of the commands are the same as they were several years ago. That's why we hope to follow up with a *KShell II* for Level II. We'll also upgrade our advanced utilities.

*Dale*: Do you see any problems in the future?

*Paul*: We are market-driven. The type of program we are developing requires at least six months to develop. If the market stays with us, we will continue to support it. But if the market dies down, we will have to make it a smaller percentage of what we are doing. I like this market; it is fun and serious, entertaining and productive!

### What Is a Pathlist?

M. L. Braun of Bellevue, Ohio, wrote us this month to ask for some additional help with OS-9. He needs to know how to read a directory and print it out and how to load the OS-9 programs from RAINBOW ON DISK.

The first thing to remember is that if you want to give OS-9 a complete pathlist, you must start that pathlist with a slash (/). For example, if you want to give OS-9 a complete pathlist to the `dir` utility command on your standard OS-9 system disk, you would type:

```
/d0/cmds/dir
```

This command line tells OS-9 you want to run a program stored in a file named `dir`. That file is stored in a directory named `CMDS`, which is a file containing a directory that is stored in a directory named `/d0`. The slash tells OS-9 you want it to start its search for the file named `dir` on a device, i.e., disk drive `/d0`.

If you have just booted a copy of the standard system disk you received when you bought OS-9, you will be using a current data directory named `/D0` and a current execution directory named `/D0/CMDS`. Because OS-9 tries to load files from its current execution directory, you could have have simply typed: `dir`.

*Hint . . .*

## Precautionary Poke

If you are looking for a way to trap the entire CoCo keyboard, look no further. If you want to "turn off" the keyboard, just use `POKE65281,0`. To turn it back on, use `POKE 65281,4`. This is great during demo programs or during critical computations where an inadvertent press of the BREAK key might cause a good deal of lost data. Just make sure this poke is not in effect when your program asks for keyboard input. This would obviously result in a locked-up system.

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After you have typed either of the commands, you will see a listing of the files stored in your current data directory, `/d0`. It most likely looks something like this:

```
 Directory of   .   19:23:59
CMDS   SYS    DEFS    startup
```

The three names printed in uppercase letters are directories. The other file, `startup`, is a straight text file that contains an OS-9 procedure file that is executed for you automatically at startup. If you wanted to see the names of the files in the `DEFS` directory, you would type:

```
dir defs
```

One of the files in that directory is named `OS9Defs`. If you wanted to look at that file you would type:

```
list defs/OS9Defs
```

When you typed that command, your current data directory was `/d0`. This means you did not need to type the complete pathlist:

```
list /d0/defs/OS9Defs
```

If you find you understand what you are doing by typing complete pathlists, by all means type them. After you become more familiar with the system, you will get lazy and want to learn the shortcuts built into OS-9.

Braun wanted to learn to load and run the programs from "KISSable OS-9" distributed on RAINBOW ON DISK. To do this, he will need to remember that the binary (executable) code is stored in directories named `CMDS` on those disks. The source code on the disks is usually stored in directories named `SOURCE`. If he has two disk drives, Braun can place his RAINBOW ON DISK in Drive `/d1` and type:

```
dir /d1
```

This command line assumes that he still has his OS-9 system disk with its `CMDS` directory loaded in Drive `/d0`. If he sees a directory named `CMDS` on Drive `/d1` when he types the command line above, he can look at the names of the files by typing:

```
dir /d1/CMDS
```

Let's assume he sees a file named `demo` and wants to run it. Let's also assume it contains one or more executable OS-9 modules. How can he load this file? First, he has to stop and remember that his current execution directory is set to `/d0/CMDS`. This means that if he types, for example, `demo`, OS-9 will look in `/d0/CMDS` and won't be able to find a file named `demo`. It will then report the infamous "file not found" Error 216. What happened? What can he do to run `demo`?

There are two answers to that question. Braun can either type a complete pathlist to the file or he can change his current execution directory to `/d1/CMDS` where the file named `demo` is stored. To take the first course, he would type:

```
/d1/CMDS/demo
```

If he would rather use the second approach, he could type:

```
chx /d1/CMDS
demo
```

Or, he could have loaded the modules in the file named `demo` while his execution directory was still set at `/d0/CMDS` by typing:

```
load /d1/CMDS/demo
```

He could then run it by typing:

```
demo
```

Time out for one more "gotcha" and we'll move on. What would have happened if Braun had changed his current execution directory to `/d1/CMDS` and then tried to load `demo`? He would have typed:

```
load demo
```

After typing this command line, he would again receive the "file not found" error message. Why? Because his current execution directory was set to `/d1/CMDS`, and `load` was stored in `/d0/CMDS`. When OS-9 went to its current execution directory to find `load`, the cupboard was bare.

Braun also mentioned that he would like to be able to print out a directory. To do that he merely needs to redirect his output to the printer. Assuming he has a serial printer plugged into his RS-232 port, he can type:

```
dir /d1/CMDS >/p
```

This will print a listing of the contents of the directory `/d1/CMDS` on his printer. Hopefully, if you are brand new to OS-9, this short tutorial will help get you off to a fast start.

### Not a Good Idea, But . . .

Here's a tip from Ian Hodgson of Dorval, Quebec. Hodgson needed to run some OS-9 Version 1.01 programs on his CoCo 3. He discovered he could do this by booting in Version 2.00.00

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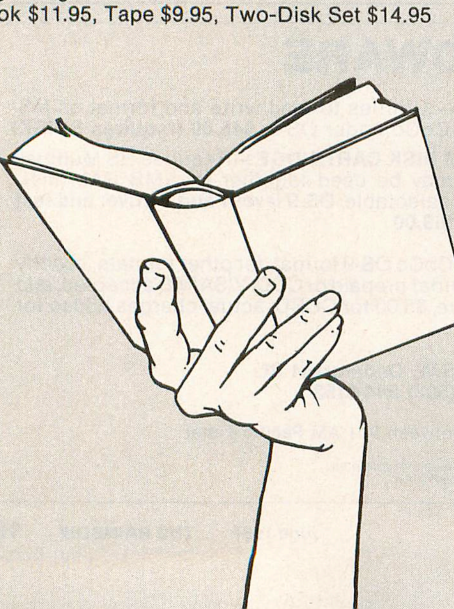

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from a program disk that uses it, *DeskMate*, for example. After the initial boot, he did a warm reset by pressing the reset button and everything worked fine. Of course, you'll soon discover that OS-9 Level II is the only way to tap the real power under the Color Computer 3's hood.

### *PrintForm* Update

In the May 1986 edition of "KISSable OS-9" we featured the source code for a shareware program named *PrintForm* from Frank Malaney of Pataskala, Ohio. Again, if you need an excellent print formatter and don't want to type in the source, Malaney will send it to you on disk if you send him a shareware donation of $15. His address is 8708 Mink Street SW, Pataskala, OH 43062.

*PrintForm* is versatile. It lets you change a printer personality file when you move up to a newer model. Malaney has received many questions about this process during the past year and decided to share some of the techniques needed to generate a new printer personality file with "KISSable OS-9" readers.

Control sequence codes are stored in a file in your execution directory named `prtr.contrl`. This file contains information about your printer and the control letter sequences you need to send to it. When *PrintForm* is first called, it loads `prt.contrl`, your printer personality file.

The first step is to understand what *PrintForm* expects in this printer personality file and how it is used. *PrintForm* was developed with the idea that printer technology is constantly changing and that your printer may not be one of the currently popular models.

Malaney decided you should be able to configure the program to your printer and your needs on a semi-permanent basis. He realized that there had to be a simple and reasonable method for you to generate the printer personality file without resorting to programming. He also recognized that the method used should have some self-documenting procedures so that, at a later time, it could be easily revised or updated.

The concept that evolved was to create a printer module using an editor and include provisions for documenting each control sequence. The printer module is then processed by a program called `printer.mod` to compile the printer personality file `prtr.contrl`.

The `printer.mod` program does not perform any error checking on your data. The format must be followed exactly,or your printer personality file will not be correct.

The letter associated with the control code sequence that follows must be a capital letter in the first column. A space must follow the letter. The first number of the printer code follows. It must be a decimal number. A space follows. This sequence of a decimal number and space continues through all the numbers required to implement the desired printer function with that control letter. You may use up to eight numbers for any one letter. An asterisk terminates the sequence. After the asterisk, the remainder of the line is available for comments. A typical data line with back slashes substituted for the required spaces is listed below:

```
S\114\21\45\6* This is a typical
line with back slashes for
spaces
```

This is how the line would actually be entered:

```
S 114 21 45 6 * This is a typical
line with proper spaces
```

You will find that sometimes you may need to use more than one printer control sequence to get the desired result. For example, if your printer requires a 27 45 to cancel double wide and a 27 34 65 to set up 10 cpi to be assigned to control letter C, you would type:

```
C 27 45 27 34 65 * Cancel double
wide and set for 10 cpi
```

Note that we have documented exactly what the control letter is intended to do. Decoding those strings of numbers at a later date is not easy!

You may need to spend a lot of time with your printer manual to find out exactly what your printer will do and the code number sequences needed to do it. You may also find that certain modes of operation preclude other modes. For example, certain Gemini models will not print superscripts or subscripts in the emphasized mode. If something does not seem to be working properly, review your manual very carefully. Remember, *PrintForm* was

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designed not to limit what your printer is capable of doing. But, your printer has definite limitations and it may not be able to do everything listed here.

The control character can also be defined in the printer module for inclusion in the printer personality file. This is done by putting an equal sign (=) in the first column where the control letter normally appears followed by a space, the ASCII value of the control character expressed as a decimal number, another space and the required asterisk. A typical line for this is shown here:

```
= 92 * sets back slash as control
code
```

The letters need not be in alphabetical order. The control character may be at any fixed position in the list. The most important requirement is for the spaces between the letter, the numbers and the asterisk. Remember, you cannot use more than eight decimal numbers per control letter.

Here's how you compile a printer personality file. Assuming that your printer module is named `module`, the following sequence does the job:

1) Check and verify that `printer.mod` is in your execution directory.
2) Enter `print.mod <module`
3) You will see a status report that tells you the printer module file has been read.
4) The disk drive will come on and write the file to your current execution directory.

**More Shell Prompts**

Dave Satterfield of Carson City, Nevada, wrote to suggest they put the following patch in their start-up files.

```
debug
l shell
. (space) .+37
=48
=20
=07
q
```

If you do this, you'll be greeted with the familiar OK followed by a bell tone. The address above is for the standard OS-9-Level I, Version 2.00.00 shell. I looked at the shell that comes with OS-9 Level II and found the `OS-9` prompt at an offset of 36 Hex bytes. If you want your OS-9-based Color Computer to look like it's running UNIX, you could change the prompt code above to:

```
=24
=20
=07
```

**OS-9 Level II Patches Already**

Hackers sure love to find out what makes a system tick. Would you believe that before OS-9 Level II was in the stores, a patch file was available in the RAINBOW Delphi OS-9 Online SIG?

Courtesy of Chuck Hoffman: If you would like to make your floppy disk drive motors shut off sooner, make the following patches to *CC3Disk*:

| Offset | Old Value | New Value |
|---|---|---|
| $329 | $F0 | $80 |
| $3F0 | $F0 | $80 |
| $42A | $F0 | $80 |

**Listing 1:** `At`

```
****************************************************************
*
* AT  -  (c) 1986 by STEPHEN B. GOLDBERG
*
* Use: at <time> <cmdfile>
*      Executes 'cmdfile' at future 'time'
*
* 'Cmdfile' is the filename or pathlist of an OS-9
* procedure file.
*
* If 'cmdfile' doesn't exist you will be prompted for file
* entries from the keyboard just like the 'Build' utility.
*
* All output to the screen (standard output path and
* standard error path) is redirected to /nil.  If you
* want to save any of it, you must redirect these paths
* in the procedure file's commands or in the lines that
* are entered from the keyboard to other files.
*
* Time is set using 24 hour clock (0 to 23 hours and
* 00 to 59 minutes).  A one or two digit time entry
* is considered hours.  A three or four digit time
* entry is considered hours and minutes.
*
* EXAMPLES:
*          OS9: at 930 /d1/workfile <ENTER>
* Executes the commands in 'workfile' at 9:30am
*
*          OS9: at 15 /d0/newfile <ENTER>
*          ? format /d1 r"NEW DISK" <ENTER>
*          ? backup #30k <ENTER>
*          ? yy <ENTER>
*          ? <ENTER>
* Builds 'newfile' from keyboard and executes it at 3pm
*
* NOTE: The 'Atrun' module must be in current execution
* directory and the Nil and NilDrv modules must be in
* RAM for 'At' to function.
*
        ifp1
        use     /d0/defs/os9defs
        endc
*
        mod     len,name,prgrm+objct,reent+2,entry,dsiz
*
hour    rmb     1     set hour
min     rmb     1     set minute
count   rmb     1     digit count
```

If you have some old OS-9 Level I disks laying around that you have formatted with the back of the disk `/d0` as `/d2` and `/d1` as `/d3`, you can read that data off onto an OS-9 Level II double-sided disk with these patches:

| Offset | Old Value | New Value |
|---|---|---|
| $2AE | $04 | $41 |
| $2AF | $40 | $42 |

Here's a quick way to get that data off of the old disks on to the true, double-sided disks you will always want to use with OS-9 Level II: Temporarily patch the device descriptor `/dd` to make it look like `/d2` or `/d3`. Here are the offsets and values, first for `/d2`:

| Offset | Old Value | New Value |
|---|---|---|
| $13 | $00 | $02 |
| $19 | $02 | $01 |
| $22 | $C4 | $B2 |

| Offset | Old Value | New Value |
|---|---|---|
| 13 | $00 | $03 |
| 19 | $02 | $01 |
| 22 | $C4 | $B3 |

Hopefully, you'll only need these patches one time. You can save them to a disk file. When you load them, make sure you run the `iniz` utility before you try to use them:

```
load BackSide.dd
iniz d2 d3
```

The command lines above assume that you have saved the `/dd` device descriptor patched above and then merged them into a file named *BackSide*. You must also remember to verify the new files with verify's update option and set the execute attribute in the new file. Here's one possible sequence.

```
save /d0/patchedD2 (space) D2
save /d0/patchedD3 (space) D3
verify</D0/patchedD2
>/D0/D2.dd U
verify</D0/patchedD3
>/D0/D3.dd U
merge /d0/D2.dd /D0/D3.dd
>BackSide.dd
attr /D0/BackSide.dd e pe
```

Additionally, before you use `/d0` and `/d1` while `/d2` and `/d3` are installed, you must make sure to modify the `/d0` and `/d1` device descriptors to tell *CC3Disk* that they are now single-sided drives. The easy way to do this is to use the `dmode` utility command from Computerware.

```
path     rmb   1   output path number
pointer  rmb   2   filename pointer
buffer   rmb   128   line buffer
         rmb   200   stack
         rmb   200   parameters
dsiz     equ   .
*
name     fcs   /at/
         fcb   1  edition number
         fcc   /(c) S.Goldberg/
**********************************
*
* DECIMAL TIME TO BINARY TIME
*
fixtime  ldd   ,--x   get digits
         stb   ,u   save units
         dec   count   done?
         beq   back   yes, return
         ldb   #10
         mul   multiply by 10
         addb  ,u   add units
         stb   ,u   save total
         dec   count   count digit
back     rts   return
**********************************
*
* CHECK AND SET TIME PARAMETER
*
entry    clr   count   zero digit counter
         clr   min   zero minutes byte
         lda   ,x   get first digit
testloop suba  #'0   make binary
         bmi   bad   not valid, prompt & quit
         cmpa  #9   valid digit?
         bhi   bad   no, prompt & quit
         sta   ,x+   yes, save it
         inc   count   count it
         lda   ,x   next character
         cmpa  #$20   end of time param?
         bne   testloop   no, check for digit
         pshs  x   save parameter pointer
         bsr   fixtime   set minutes
         beq   hourchk   hours only
         cmpb  #59   >59 minutes?
         bhi   badtime   yes, prompt & quit
         stb   1,u   save in minutes byte
         bsr   fixtime   set hour
         bne   badtime   more than 4 digits
hourchk  cmpb  #23   >23 hours?
         bhi   badtime   yes, prompt & quit
         puls  x   retrieve parameter pointer
chkloop  ldd   ,x+   get next characters
         cmpb  #$20   space?
         beq   chkloop   yes, look again
         blo   bad   no filename, prompt & quit
         stx   pointer   save filename pointer
**********************************
*
* CREATE PROCEDURE FILE
```

```
*
         ldd     #$020b    mode and attr
         os9     i$create   create file
         bcc     savepath   save path number
         cmpb    #218    file already exists?
         beq     fork    yes, fork to 'atrun'
         bra     out    exit with other error
*******************************
*
* ERROR PROMPTS AND EXIT
*
bad      leax    <syntax,pcr   syntax error message
screen   ldy     #100    maximum length
         lda     #2    standard error path
         bsr     write    message to screen
noerr    clrb     clear error
out      os9     f$exit    quit
badtime  leax    <timerr,pcr   time error message
         bra     screen    message to screen
*
timerr   fcb     7    bell
         fcc     /WHAT TIME/
atpmpt   fcc     /? /    keyboard input prompt
         fcb     $0d
syntax   fcb     7    bell
         fcc     /Use: at <time> <path>/
         fcb     $0d
write    os9     i$writln    output line
         bcs     out    exit with error
         rts     return
*******************************
*
* BUILD FILE FROM KEYBOARD
*
savepath sta     path    save output path number
getloop  leax    <atpmpt,pcr    command prompt
         ldy     #2    two characters
         lda     #1    standard output path
         bsr     write    to screen
         leax    buffer,u    line buffer
         clra     standard input path
         ldy     #128    maximum line length
         os9     i$readln    get line
         bcs     out    exit with error
         lda     path    output path
         cmpy    #1    carriage return?
         beq     close    yes, close file
         bsr     write    line to file
         bra     getloop    get next line
close    os9     i$close    close file
         bcs     out    exit with error
*******************************
*
* FORK 'ATRUN' INTO BACKGROUND
*
fork     ldu     pointer    filename pointer
         ldd     hour    get time set
         std     ,--u    put with filename
         ldy     #200    maximum parameter length
```

Another way would be to patch `it.sid`, which is the location in the device descriptor that tells the driver how many sides are available on the media. `it.sid` can be found at an offset of 19 Hex bytes from the start of the device descriptor module. You will want to change this byte from `02` to `01` if you have been running with double-sided drives.

**Name Warning**

While Bill Brady was working on his *Wiz* terminal program, he tried to build a device descriptor named `WT2` — it probably stood for *Wiz Terminal 2*. Unfortunately, it wouldn't work after it had been installed in his `OS9Boot` file. It did work when he merely loaded and `inized` it. Fortunately, after he renamed it `M2W`, it did work properly after installation in the `OS9Boot` file. Interesting quirk.

**About Attr**

Sam Johnson asked for some help with the `attr` utility on the Delphi OS-9 SIG recently. Here goes. To determine the attributes of a file, you can type:

```
attr /d0/CMDS/dir
```

If things are set up normally on your system, you should see the following line on your screen:

```
--e-rewr
```

That line is trying to tell you that the file you have just checked can be executed by both its owner and the public. It can also be read by the owner and the public. However, it can only be written to by the owner. If you look at an extended directory listing of the `CMDS` directory, you will see that its owner is the superuser, user number zero. On a single-user system, that will generally be you. Therefore, you have permission to do anything you want.

Now, let's assume you want to prevent the file from being deleted. In other words, you don't even want to be able to write to the file yourself. Since you own the file, you can set its attributes. The following command will work fine.

```
attr /d0/CMDS/dir -w
```

After you run this command, you'll see:

```
--e-re-r
```

This means that anyone can read this file. Likewise, anyone can execute the code in it. However, no one can write to it. Therefore, no one can delete it. Not even you. To delete it, you would need to go in and change the write attribute to `w` like this:

```
attr /d0/CMDS/dir w
```

One more thing. There are certain things that certain utilities can't do. For example, the `dir` command can't list the files in a normal text file — there aren't any! Or, `list` can't list a directory like a normal text file. If you try to do either of these things, `list CMDS` or `dir startup`, you will get the infamous "no permission" Error 214 message. The secret comes with confidence. Don't be afraid of the OS-9 error messages. Just sit back, take a deep breath and try to figure out what happened. Attack the problem in a logical manner and the problem will be obvious to you. One good way to develop your skills with this is to make mistakes on purpose just to see what happens. Remember those test results and the next time you see that error message, you'll be ahead of the curve.

**June Listings**

This month we feature another attempt to simulate a UNIX command in the Color Computer OS-9 environment. `At` lets you execute an existing OS-9 procedure file or a file entered from the keyboard at a future time.

The Color Computer version of `At` is different from the UNIX version because `AtRun` receives its parameters directly from `At` rather than by scanning a disk file. This keeps disk use to a minimum. This version of `AtRun` checks the time every four seconds instead of every 20 minutes or so like the UNIX version. `At` author Stephen Goldberg of Bethpage, New York, didn't write a date parameter into his code because he felt that most Color Computer users do not leave their computers running continuously.

You'll find `At` useful when you have a long, disk-intensive procedure to perform, and you don't want to take up your own work time waiting for it. For example, when your files become fragmented into small bits and pieces spread all over the disk after you have edited them many times, you could have your Color Computer run a procedure file. Start by typing the following sequence of commands into a named fix file:

```
chd /d0
format /d1 r "New Disk"
dsave -b -s20 /d0 >/d0/copyfile
```

```
          ldd   #$0001   type, lang. and data size
          leax  <atrun,pcr   name of program
          os9   f$fork   fork to 'Atrun'
          bcs   out   exit with error
          bra   noerr   quit 'At'
*
atrun     fcc   /atrun /
          emod
len       equ   *
          end
```

**Listing 2:** `AtRun`

```
*******************************************************
*
* ATRUN    -    (c) 1986 by STEPHEN B. GOLDBERG
*
* Checks time every four seconds and executes the
* command(s) passed from 'At' at the correct time.
*
          ifp1
          use   /d0/defs/os9defs
          endc
*
          mod   len,name,prgrm+objct,reent+2,entry,dsiz
*
settime   rmb   2   set hour and min
realtime  rmb   3   yr,mo,day
chktime   rmb   3   hr,min,sec
pointer   rmb   2   parameter pointer
          rmb   200   stack
          rmb   200   param
dsiz      equ   .
*
name      fcs   /atrun/
          fcb   1   edition number
          fcc   /(c) S.Goldberg/
direct    fcc   ">/nil >>/nil"
          fcb   $0d
shell     fcc   /shell /
********************************
*
* SET UP REDIRECTION TO /NIL
*
entry     ldd   ,x++   get time parameter
          std   settime   save set time
          leay  -13,x   room for redirection
          tfr   y,s   move stack out of way
          sty   pointer   save command address
mvloop    ldd   ,x+   command character
          sta   ,y+   move it
          cmpb  #$0d   done?
          bne   mvloop   no, do again
          leax  <direct,pcr   redirection
dirloop   lda   ,x+   get character
          sta   ,y+   add to command
          cmpa  #$0d   done?
          bne   dirloop   no, do again
********************************
```

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```
chd /d1
/d0/copyfile
del copyfile /d0/copyfile
```

Then on the day you decide it's time to clean up your disk, type:

```
at 1205 /d0/fixfile
```

Just before you leave for lunch, stuff a blank disk in `/d1`. While you're gone, your Color Computer will go to work by itself, and you'll have a completely unfragmented disk in `/d1` when you return.

If the file you give `At` doesn't exist, it will be created and you will be prompted for entries from the keyboard exactly as with the `build` utility. Type in each line at the ? prompt. Make no entry and press ENTER when done.

`AtRun` always redirects the standard output and standard error path to the bit bucket, i.e., the `/nil` device descriptor. If you want a record of this output, you can redirect these paths to disk files in the command lines in your procedure file.

Until next month. Enjoy Level II! May all of your windows be clean and error free. ☐

```
*
* TIME COMPARISON LOOP
*
timechk  leax  realtime,u  time buffer
         os9   f$time    get current time
         bcs   out    exit with error
         ldd   settime    get set time
         cmpd  chktime    same?
         beq   execute    yes, execute command(s)
         ldx   #240    no, 240 ticks
         os9   f$sleep    sleep for 4 seconds
         bcs   out    exit with error
         bra   timechk    check time again
*************************************
*
* EXECUTE THE COMMAND(S)
*
execute  leax  <shell,pcr    Shell name
         ldd   #$0001    type, lang. and data size
         ldy   #200    maximum param length
         ldu   pointer    parameter address
         os9   f$fork    fork to Shell
         bcs   out    exit with error
         clrb   clear error
out      os9   f$exit    quit
         emod
len      equ   *
         end
```

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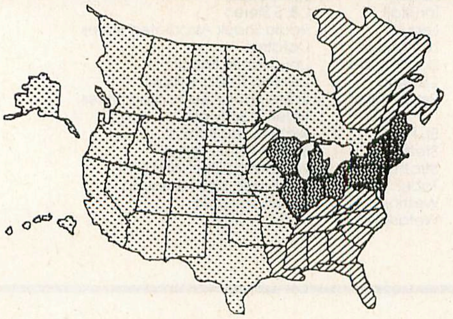

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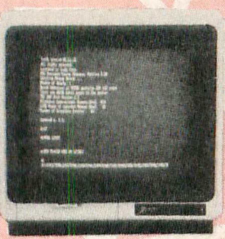

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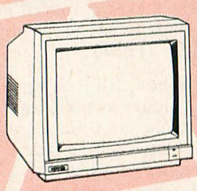

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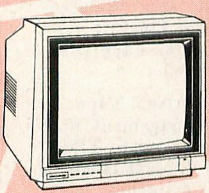

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LOWERCASE COMMANDS are OK! EDITOR 3 lets you type in lowercase any time or all the time. Lowercase command words are automatically translated to uppercase for BASIC. Of course, lowercase text within quotes stays lowercase. This is great when typing wiht the CoCo 3's 40 or 80 column mode with true lowercase!

MERGE LINES within a program with just a few keystrokes!

AUTO KEY REPEAT — Hold down any key and it will repeat.

INVISIBLE — Once EDITOR 3 has been loaded in, it is activated with a single keystroke! It hides itself out of the way of other programs and can be turned off any any time. Pressing RESET will not hurt EDITOR 3!

EASY TO USE — Installation takes seconds! Well-written goof-proof manual included.

COCO 1 & 2 — Yes, even though this program was conceived for the powers of the new CoCo 3, we still support the previous Color Computers. They too, need their BASIC Freedom!

EDITOR 3 — So easy and handy, you'll never want to run your CoCo without it!

Available on DISK only for CoCo 3 @ $29.95 + s/h

CoCo 1/2 version can not support 40 or 80 column screens. CoCo 1/2 version is available on TAPE for $27.95 + s/h or DISK for $29.95 + s/h.

## Also Available for CoCo 1 & 2 only:

VDOS, the UnDISK: Save multiple programs in memory! Works with or without a disk drive. TAPE $27.95 + s/h, DISK $29.95 + s/h

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This universal driver works with all monochrome monitors, and is easily installed without clips, jumpers or soldering (except in some later CoCo 2s with soldered-in video chips). Here's crisp, clear, flicker-free monitor output with all the reliability you've come to expect from HJL Products.

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